HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

DRAFT

Hatchery Program	Methow and Okanogan Summer Chinook Program
Species or Hatchery Stock	Upper Columbia River Summer Chinook
Agency/Operator	Washington Department of Fish & Wildlife
Watershed and Region	Mid-Upper Columbia Sub-basin/Columbia Cascade Province
Date Submitted	
Date Last Updated	September 1, 2005

Section 1: General Program Description

1.1 Name of hatchery or program.

Methow and Okanogan Summer Chinook Program. Upper Columbia Summer Chinook Salmon Mitigation and Supplementation Program- Eastbank (Rocky Reach and Rock Island Settlement Agreements) and Wells (Wells Settlement Agreement) Fish Hatchery Complexes.

1.2 Species and population (or stock) under propagation, and ESA status.

Upper Columbia River Summer chinook salmon (*Oncorhynchus tshawytscha*); summer-run component upstream of Priest Rapids Dam.

ESA Status: Not listed and not a candidate for listing. In the 1997 "Status Review of Chinook Salmon from Washington, Idaho, Oregon, and California", NMFS indicated that summer/fall chinook salmon in this ESU were not in danger of extinction, nor were they likely to become so in the foreseeable future (Myers et al.1998).

1.3 Responsible organization and individuals.

Name (and title):	Rick Stilwater
	Eastbank/Wells Hatchery Complex Manager
Agency or Tribe:	Washington Department of Fish & Wildlife
Address:	13246 Lincoln Road, East Wenatchee, WA 98802
Telephone:	(509) 884-8301
Fax:	(509) 886-0823
Email:	stillwrcs@dfw.wa.gov

Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program.

The Anadromous Fish Agreements and Habitat Conservation Plans (Mid-C. HCP) for Wells, Rocky Reach and Rock Island hydropower projects established a formal decision making body for the artificial production programs operated within the region and covered by the Mid-C. HCP. The decision making body, referred to as the Hatchery Committee, is composed of one (1) representative of each Party to include both Douglas and Chelan County PUD representatives (districts), the United States Fish and Wildlife Service (USFWS), the National Marine Fisheries Service (NMFS), the Washington Department of Fish and Wildlife (WDFW), the Confederated Tribes of the Colville Reservation (Colville), the Confederated Tribes and Bands of the Yakama Indian Nation (Yakama), the Confederated Tribes of the Umatilla Indian Reservation (Umatilla) (collectively, the Joint Fisheries Parties or the JFP); and American Rivers, Inc., (American Rivers) a Washington D.C., nonprofit corporation.

The Hatchery Committee is tasked with oversight development of recommendations for implementation of the hatchery elements of the Mid-C. HCP. The Hatchery and Genetic Management Plans (HGMPs) are reflective of the decisions and implementation of actions as deemed appropriate and consistent with the Mid-C. HCP Hatchery Committee. Decisions and implementation actions made by the HCP Hatchery Committee will be dynamic and in the future, current DRAFT HGMPs would need to be updated during this on-going iterative process. Furthermore, the Hatchery Committee is responsible for determining program adjustments considering the methodology described in Biological Assessment and Management Plan (BAMP 1998) and providing recommended implementation plans to the District.

The districts are responsible for funding to include facility improvements, changes to artificial production programs, monitoring and evaluation of programs as identified in the Hatchery Compensation Plan, the Permit and the Agreement. The Districts or its designated agents shall operate the hatchery facilities according to the terms of the Section 8 “Hatchery Compensation Plan”, the ESA Section 10 permit(s), and in consultation with the Hatchery Committee.

Co-operators	Role
Public Utility District No. 1(PUD) of Chelan County	Funding Source
Involved parties include those associated with the Columbia River Fish Management Plan and the U.S. v. Oregon court decision	Program Coordination, Co Management, and Policy

1.4 Funding source, staffing level, and annual hatchery program operational costs.

Funding Source
Public Utility District (PUD) No. 1 of Chelan County

Operational Information	Number
Full time equivalent staff	13
Annual operating cost (dollars)	$1,942,262.00

Program is the funded by Public Utility District No. 1 of County for the purpose of mitigation for lost fish production associated with hydroelectric power system development in the region. Costs cannot be broken out for individual programs specifically from the total staff and operating budget at Eastbank Hatchery Complex. Eastbank Hatchery: 18 Full Time Equivalent Staff/Budget= $259,600.00.

1.5 Location(s) of hatchery and associated facilities.

Broodstock source	Wells Dam (East Bank Fish Ladder)
Broodstock collection location (stream, RKm, sub-basin)	Wells Dam/Columbia River/RKm 861.0/Mid-Upper Columbia
Adult holding location (stream, RKm, sub-basin)	Eastbank Hatchery/Columbia River/~RKm 790/Mid-Upper Columbia
Spawning location (stream, RKm, sub-basin)	Eastbank Hatchery/Columbia River/~RKm 790/Mid-Upper Columbia
Incubation location (facility name, stream, RKm, sub-basin)	Eastbank Hatchery/Columbia River/~RKm 790/Mid-Upper Columbia

Rearing location (facility name, stream, RKm, sub-basin)	Eastbank Hatchery/Columbia River/~RKm 790/Mid-Upper Columbia;
Acclimation pond location (facility name, stream, RKm,sub-basin)	Methow River - Carlton Pond Satellite/Methow River/RKm 56.4/Methow Okanogan River - Similkameen Pond – located on the Similkameen River (WRIA 49-0325) at rm 3.1 (rkm 5), near the town of Oroville. Bonaparte Pond - located on the left bank at rm 56 (rkm 90.2) of the Okanogan River about 1 mile downstream from the town of Tonasket.

1.6 Type of program.

Integrated Harvest Programs

1.7 Purpose (Goal) of program.

The purpose of this summer-run chinook salmon propagation program is to mitigate for the loss of summer chinook salmon adults that would have been produced in the Methow and Okanogan River Basins in the absence of the Wells, Rocky Reach, and Rock Island hydroelectric projects. The goal of the program is to supplement the natural population utilizing locally adapted broodstock. Summer chinook are reared and released in several major tributaries to the Upper Columbia and the Mid-Columbia mainstem downstream to Rocky Reach Dam. This goal can be met through the use of the of fish rearing facilities to increase the number of adults that return to the basin by increasing survival at life-history stages where competitive or environmental bottlenecks occur. Concurrently, a release strategy for hatchery production is employed that will not create a new bottleneck in productivity through competition with the naturally produced component of the population and other naturally produced stocks. Local integration of summer chinook (and fall chinook) in the Okanogan system is being planned by the Colville Tribe master plan for the Chief Joseph Hatchery. Current integration success of the Methow program is limited by the ability to acquire local broodstock (currently collected at Wells Dam) and to acclimate smolts to improve imprinting and minimize straying.

1.8 Justification for the program.

The summer chinook propagation program is a component of the Mid-Columbia Hatchery Program, a part of an application for a 50-year multi-species Habitat Conservation Plan (HCP) and re-licensing agreement for the PUDs. This plan has two objectives: (1) to help recover natural populations throughout the Mid-Columbia Region so that they can be self-sustaining and harvestable, while maintaining their genetic and ecologic integrity; and (2) to compensate for a 7% mortality rate at each of the five PUD-owned mid-Columbia River mainstem dams (Wells, Rocky Reach, Rock Island, Wanapum, and Priest Rapids) in a manner that is consistent with the first objective. Through the regional hatchery plan, the summer chinook artificial production program has been integrated with harvest management objectives to provide run size enhancement and fishery benefits. Biological risks to listed species in the Columbia Basin posed by hatchery chinook releases, including predation, competition, and disease transfer, are expected to be minimal.

The Rock Island Fish Hatchery Complex (RIFHC) began operation in 1989 as mitigation for salmonids lost as a result of operation of Rock Island Dam. The facility was constructed by, and operates under funding from, Chelan PUD originally through the Rock Island Settlement Agreement. Currently, Chelan PUD and fisheries agencies and the Colville Confederated Tribes have signed a habitat conservation plan (HCP). When the HCP was incorporated into Chelan PUD's FERC license, it superseded the Settlement Agreement. Built in 1989, the Rock Island Fish Hatchery Complex (RIHC) is one of three components of the mitigation agreement relating to the construction of Rock Island Dam. The mitigation agreement requires that hatchery production be equivalent to the number of naturally produced adults lost due to smolt mortality at the Rock Island Dam. Furthermore, the mitigation agreement requires that the hatchery programs be consistent with maintenance of genetically distinct populations.

The goal of the RIFHC is to use artificial production to replace adult production lost due to smolt mortality at mainstem hydroelectric projects, while not reducing the natural production or long-term fitness of salmonid stocks in the area (WDF 1993). Specific goals of the WDFW hatcheries are:

- Hatchery production [in terms of number of fish released from each site],
- Minimize interactions with other fish populations through rearing and release strategies, maintain stock integrity and genetic diversity of each population or unique stock through proper management of genetic resources.
- Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens,
- Conduct environmental monitoring to ensure that the hatchery operations comply with water quality standards and to assist in managing fish health, communicate effectively with other salmon producers and managers in the Columbia River basin, and with implementers of local and regional flow and spill programs, and
- Develop a Conservation Plan and conduct a comprehensive monitoring/evaluation program to determine that the program meets mitigation obligations, estimate survival to adult, evaluate effects of the program on local naturally producing populations, and evaluate downstream migration rates in regards to size and timing of fish released.

Although the Upper Columbia River Summer/Fall Chinook ESU were not in danger of extinction, nor were they likely to become so in the foreseeable future, the Methow and Okanogan River stocks were considered depressed based on negative escapement trends. The long-term trend for the Okanogan population is –5.2% and –8.8% in the short term (1987-96) (Brown, 1999). Summer/fall Chinook spawning occurs primarily in the Similkameen River associated with the WDFW artificial production program. Lesser amounts of spawning have occurred in the Okanogan River below Osoyoos Lake. Other than the Similkameen River, historic spawning habitat for summer/fall Chinook throughout the Okanogan River has been largely underutilized for decades. In past years, however, returns of summer/fall Chinook to the Similkameen River and upper Okanogan have increased substantially. High smolt-to-adult survival of the hatchery fish from the Similkameen Pond has produced an extremely high spawner density in the Similkameen River (>400 redds/km). Unfortunately, this has not produced the expected increase in natural-origin fish (the capacity of the Similkameen spawning habitat is being exceeded due to redd superimposition).

They predominately have an "ocean-type" life-history, which has among many traits, a tendency to migrate to the ocean as sub-yearlings (less than a year after they hatch). Currently, more summer and fall chinook salmon are artificially propagated in the region than any other species. Most hatcheries rear them to a yearling stage because they survive better at that age than sub-yearlings. Since yearling chinook salmon released from hatcheries survive at much higher rates than sub-yearlings (up to 15 times higher), fewer fish need to be propagated as yearlings to meet the compensation levels required under the second objective. In the short-term, this strategy appears to have fewer ecologic impacts to natural fish (although some indicators are inconclusive). However, the Hatchery Work Group recognized that this strategy, in combination with relatively high numbers of naturally spawning hatchery fish, may have deleterious long-term genetic effects to natural fish. This may be impossible to detect in a timely manner. Given these constraints, the chosen strategy is to continue to propagate yearlings to compensate for dam mortalities; evaluate the genetic, ecologic, and demographic characteristics of the natural populations throughout the hatchery program; and recognize the risk that potential impacts may not be detected in sufficient time to correct them.

Methow River/Carlton Acclimation Pond - Methow River summer chinook salmon used as broodstock are the progeny of natural or hatchery-origin fish originating from the Methow and Okanogan River watersheds collected in July and August at Wells Dam on the mainstem Columbia River. Up to 492 summer chinook salmon adults may be collected as broodstock each year for both the Methow and Okanogan system production. WDFW's Eastbank Hatchery is used for spawning, incubation and early rearing. Summer-run chinook salmon juveniles produced at Eastbank are transferred to Carlton Pond on the Methow River for acclimation and release. Up to 400,000 yearling summer chinook smolts may be released into the Methow River each year through the program. Ocean-type chinook salmon return to the Methow River primarily in July and August, but may enter the river into early October. No summer chinook salmon spawn in the tributaries of the Methow, and virtually all summer chinook salmon spawn downstream of the Chewuch River confluence. The furthest downstream spawning is near the mouth of French Creek, a total of 61 km of spawning habitat. Spawning begins in late September in the upstream reaches and ends in early November in the lower river (Hillman and Ross 1991). Emergence timing is probably January through April. Juveniles may rear from a few months to a year before migrating downstream. Juveniles generally emigrate to the ocean as sub-yearling fry, leaving Methow River from one to four months after emerging from the gravel in April.

The current production of summer chinook salmon in the Methow River is 400,000 marked yearling smolts (40,000 lbs. at 10 fpp), released from Carlton Acclimation Pond (a part of the Rock Island Hatchery Complex). However, the facility is designed to rear up to 520,000 (52,000 lbs. at 10 fpp). This additional facility capacity was funded by Douglas PUD for reserve production under the Wells Settlement Agreement. Under the Mid-Columbia Hatchery Program, production could increase to this full capacity. Efforts will be made to collect local broodstock on the Methow River, yet the program will rely upon marked and unmarked broodstock intercepted at Wells Dam, until a successful trap is developed on the Methow River. If additional production is required to meet future goals in the Mid-Columbia Hatchery Program, an acclimation pond could be built near the confluence of Gold Creek. Likewise, releases would be shifted from mainstem hatcheries to such an acclimation pond.

Okanogan River/Similkameen and Bonaparte Acclimation Ponds – Summer chinook juveniles produced at Eastbank Hatchery are transferred in the fall to Similkameen Pond in the upper Okanogan River watershed for acclimation and release. The fish are reared to yearling smolt size in the pond through the winter for release in the spring to acclimate the chinook to the release site. The current program for the Okanogan system is to transfer 600,000 sub-yearlings from Eastbank FH to the Similkameen Pond in October. Up to 576,000 summer chinook salmon yearling smolts may be released in the spring each year. In 2004, 100,000 of the program's 576,000 smolt release were reared at the Bonaparte Pond, located at river mile 56 on the Okanogan River, with the intent of dispersing subsequent spawning of returning adults in historical habitats. This program may continue in the future if facility modifications are made to reduce over-winter mortality. As soon as possible, the composite broodstock from Wells Dam Trap and, at times, Wells Hatchery will be replaced with broodstock collected specifically from the Okanogan River. Means to collect local broodstocks on the Methow and Okanogan river will be studied as returning salmon from the Carlton (Methow River), Similkameen (Okanogan River), and Dryden (Wenatchee River) programs volunteer into Wells FH, yet they are identified by CWT and can be placed into their program of origin if desired (Eltrich et al. 1995; BAMP 1998). Current broodstock management mixes summer/fall Chinook destined for the Methow and Okanogan Rivers. This management strategy will continue until separate broodstock collection capabilities are developed for the Okanogan sub-basin and at the proposed Chief Joseph Dam Hatchery. Testing of live-capture, selective fishing gears has been proposed as the primary means of collecting summer/fall Chinook destined for the Okanogan River to supply broodstock for propagation programs in the sub-basin. When selective collection capability has been established for the Okanogan sub-basin, then broodstock collection at Wells Dam will be terminated.

The Colville Tribes are proposing the construction of Chief Joseph Dam Hatchery and the use of 2 new acclimation ponds on the Okanogan River to increase the abundance, distribution and diversity of the propagation program for summer/fall Chinook in the Okanogan sub-basin (pers. comm. J. Peone 2005). The Colville Tribes (CCT 2004a, and Wolf and Wagner, 2004) have proposed to increase production levels of summer/fall Chinook to increase the abundance, diversity, and distribution of the naturally spawning population and provide a more stable base for tribal ceremonial and subsistence fishing and recreational angling. The proposed program would initially release an additional 400,000 yearling summer/fall Chinook from a new acclimation site proposed near river mile 49, and 700,000 yearling and sub-yearling Chinook from a new acclimation pond at the mouth of Omak Creek (river mile 32). The broodstock for these releases would constitute the later-arriving Chinook that are not included in the current propagation program. Objectives will include increasing the abundance, distribution, and diversity of natural-origin summer/fall Chinook in the Columbia, Okanogan and Similkameen rivers. Production will be dispersed to fully utilize historical spawning habitats. Yearling, early-arriving summer/fall Chinook will be reared, acclimated, and released at Similkameen, Bonaparte, and Riverside ponds, and from Chief Joseph Dam Hatchery in the future. Yearling and sub-yearling, later-arriving Chinook will be reared, acclimated, and released from Omak Pond on the lower Okanogan River and from Chief Joseph Dam Hatchery to increase spawning in historical, Columbia River habitat. The later-arriving portion of this ESU was, but is not currently propagated in the Columbia Cascade Province. Hatchery origin fish will be adipose fin clipped and most coded wire tagged to determine their role in population viability and to support tribal ceremonial and subsistence (C&S) fishing and recreational angling on hatchery-origin fish that are surplus to conservation needs (Chief Joseph Dam Hatchery Master Plan, 2004).

Authorization through Section 10(a)(1)(B) Permit Number #1347. WDFW and joint permit holders including the Public Utility District No. 1 of Chelan County (Chelan PUD), and the Public Utility District No. 1 of Douglas County (Douglas PUD) have authorization for this program through a Section 10 Permit allowing incidental take of upper Columbia spring chinook and steelhead resulting from the propagation of unlisted sockeye, summer and fall chinook at Eastbank, Wells, Priest Rapids, Lake Wenatchee sockeye, and cooperative releases. The permit expires on October 22, 2013.

The Washington Department of Fish and Wildlife (WDFW), the Public Utility District No. 1 of Chelan County (Chelan PUD), and the Public Utility District No. 1 of Douglas County (Douglas PUD) are authorized to take endangered Upper Columbia River (UCR) steelhead (*Oncorhynchus mykiss*) and endangered UCR spring chinook salmon (*O. tshawytscha*) as a result of artificial propagation programs for the enhancement of UCR steelhead, as cited in the WDFW application and the *Anadromous Fish Agreement and Habitat Conservation Plan (HCP)Wells hydroelectric Project FERC License No. 2149* with Douglas PUD for the operation of Wells Dam (DPUD 2002), the *Anadromous Fish Agreement and Habitat Conservation Plan Rocky Reach Hydroelectric Project FERC License No. 2145* (CPUD 2002a) with Chelan PUD for the operation of Rocky Reach Dam, and the *Anadromous Fish Agreement and Habitat Conservation Plan Rock Island Hydroelectric Project FERC License No. 943* with Chelan PUD for the operation of Rock Island Dam (CPUD 2002b), subject to the provisions of Section 10(a)(1)(B) of the Endangered Species Act (ESA) of 1973 (16 U.S.C. §§ 1531-1543), NOAA's National Marine Fisheries Service (NMFS) regulations governing ESA-listed species permits (50 CFR Parts 222-226), and the conditions hereinafter set forth.

The permit authorizes the WDFW, the Chelan PUD, the Douglas PUD annual incidental take of adult and juvenile, endangered, naturally produced and artificially propagated, UCR spring chinook salmon and UCR steelhead of ESA-listed species associated with the implementation of non-ESA-listed salmon artificial propagation programs in the UCR region. The programs are intended to supplement naturally spawned unlisted summer chinook salmon, fall chinook salmon, and sockeye salmon (*O. nerka*) production occurring upstream from the vicinity of Priest Rapids Dam on the mainstem Columbia River, including the mainstem Columbia River and the Wenatchee, Methow, and Okanogan Rivers and their tributaries. The artificial propagation programs exist to mitigate for lost salmon, or lost salmon productivity, resulting from the construction and operation of hydroelectric dams on the mainstem Columbia River. With the exception of the Priest Rapids fall chinook salmon program, all of the programs authorized in this permit are required mitigation in the three long-term HCP agreements mentioned above. The artificial propagation programs may lead to incidental take of migrating ESA-listed adult spring chinook salmon and steelhead during unlisted salmon broodstock trapping activities, and incidental take of rearing and emigrating ESA-listed juvenile spring chinook salmon and steelhead resulting from the release of artificially-propagated unlisted salmon juveniles into the natural environment, and during monitoring and evaluation activities of the hatchery programs that occur in the natural environment. Limitations on unlisted adult salmon broodstock collection locations and timing; limits on the number, timing, and location of juvenile salmon releases; and operational guidelines applied to minimize the risks of disease transmission, water quality impairment, and fish loss through hatchery fish screening or water withdrawals for facility operations are some strategies that the WDFW, the Chelan PUD, and the Douglas PUD will employ to minimize risks to listed fish. Unlisted salmon survival and straying levels will be monitored through externally marking hatchery fish, and/or through internal coded wire or passive integrated transponder (PIT) tagging of a representative proportion of annual juvenile fish releases. The Chelan PUD and the Douglas PUD, as joint permit holders with the WDFW, have specific conditions relating to their involvement and obligation under the HCPs and the permit. The WDFW as the primary operator of the hatchery facilities and as a managing agency of the fish resources of the state, also has specific conditions and responsibilities. The failure of one permit holder to satisfy their conditions may result in the loss of take authorization for all permit holders. Thereby, an interdependent and cooperative relationship should be encouraged in carrying out the authorized activities.

Unlisted salmon artificial propagation program activities will include:

- The collection of broodstock through trapping operations at: Wells Dam for Methow and Okanogan River summer chinook salmon populations, Wells Hatchery for summer chinook salmon releases from Wells and Turtle Rock hatcheries, Dryden and Tumwater Dams for Wenatchee River summer chinook salmon and Wenatchee sockeye salmon, and Priest Rapids Hatchery for Priest River hatchery-origin fall chinook salmon.
- The holding and artificial spawning of collected adults at Wells, Eastbank, and Priest Rapids Hatcheries, and Lake Wenatchee Net Pens.
- The incubation and propagation from the fertilized egg through the fingerling, pre-smolt or smolt life stage at the Wells, Eastbank, and Priest Rapids Hatchery complex facilities.
- The transfer of summer chinook salmon and sockeye salmon fingerlings or pre-smolts from the hatcheries for rearing at facilities in the Wenatchee, Methow, and Okanogan Rivers' watersheds, and to net-pens in Lake Wenatchee.
- The release of summer chinook salmon, fall chinook salmon, and sockeye salmon smolts into the Wenatchee, Methow, and Okanogan Rivers' basins, and into the mainstem Columbia River from the hatcheries, acclimation ponds, and net-pens on those systems.

- The monitoring and evaluation of these artificial propagation programs in the natural environment through activities such as redd counts and carcass surveys, and formal monitoring and evaluation plans are to be developed by the HCP Hatchery Committees as called for in the HCPs.

Included in the incidental take are conditions of the permit including:
Section A. Take Description and Levels
Section B. Production Levels
Section C. Program Management and Operating Conditions
Section D. Reports and Annual Authorization
Section E. Penalties and Sanctions

Operation of WDFW Facilities and Practices:

- Water rights are formalized thru trust water rights from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports.
- *National Pollutant Discharge Elimination System Permit Requirements* This facility operates under the "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System (NPDES) administered by the Washington Department of Ecology (DOE). This permit sets forth allowable discharge criteria for hatchery effluent and defines acceptable practices for hatchery operations to ensure that the quality of receiving waters and ecosystems associated with those waters are not impaired. Conduct routine water monitoring to ensure that the levels of total suspended solids, settleable solids, and water temperature at each facility to remain compliant with NPDES permits issued by Washington Department of Ecology.
- *Fish Health Policy in the Columbia Basin*. Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 5, IHOT 1995).
- Conduct routine, generally monthly, fish growth monitoring during rearing at each facility;
- Dispose of juvenile and adult carcasses via the local solid waste management system, on-station burial, or distributing carcasses into the river system of origin for nutrient enhancement after appropriate fish health certification. WDFW proposes to implement the following measures into the propagation program operation to minimize potential negative impacts on ESA-listed species.
- *Genetic Manual and Guidelines for Pacific Salmon Hatcheries in Washington*. These guidelines define practices that promote maintenance of genetic variability in propagated salmon. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 5, IHOT 1995).
- *Spawning Guidelines for Washington Department of Fisheries Hatcheries*. Assembled to complement the above genetics manual, these guidelines define spawning criteria to be use to maintain genetic variability within the hatchery populations. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 7, IHOT 1995).
- *Stock Transfer Guidelines*. This document provides guidance in determining allowable stocks for release for each hatchery. It is designed to foster development of locally-adapted broodstock and to minimize changes in stock characteristics brought on by transfer of non-local salmonids (WDF 1991).

1.9 List of program "Performance Standards".

"Performance Standards" are designed to achieve the program goal/purpose, and are generally measurable, realistic, and time specific. The NPPC "Artificial Production Review" document attached with the instructions for completing the HGMP presents a list of draft "Performance Standards" as examples of standards that could be applied for a hatchery program. If an ESU-wide hatchery plan including your hatchery program is available, use the performance standard list already compiled.

See Section 1.10 below.

1.10 List of program "Performance Indicators", designated by "benefits" and "risks".

"Performance Indicators" determine the degree that program standards have been achieved, and indicate the specific parameters to be monitored and evaluated. Adequate monitoring and evaluation must exist to detect and evaluate the success of the hatchery program and any risks to or impairment of recovery of affected, listed fish populations.

The NPPC "Artificial Production Review" document referenced above presents a list of draft "Performance Indicators" that, when linked with the appropriate performance standard, stand as examples of indicators that could be applied for the hatchery program. If an ESU-wide hatchery plan is available, use the performance indicator list already compiled. Essential 'Performance Indicators" that should be included are monitoring and evaluation of overall fishery contribution and survival rates, stray rates, and divergence of hatchery fish morphological and behavioral characteristics from natural populations.

The list of "Performance Indicators" should be separated into two categories: "benefits" that the hatchery program will provide to the listed species, or in meeting harvest objectives while protecting listed species; and "risks" to listed fish that may be posed by the hatchery program, including indicators that respond to uncertainties regarding program effects associated with a lack of data.

1.10.1) "Performance Indicators" addressing benefits.

(e.g. "*Evaluate smolt-to-adult return rates for program fish to harvest, hatchery broodstock, and natural spawning.*").

1.10.1 Benefits:

Performance Standards	Performance Indicators	Monitoring and Evaluation
1.Increase the number of naturally spawning and naturally produced adults of the target population relative to a non-supplemented population and the changes in the natural replacement rate (NRR) of the supplemented population (reference population) is similar to that of the non-supplemented population.	Natural Replacement Rate (NRR). Ho: Δ Total spawners $_{\text{Supplemented population}}$ > Δ Total spawners $_{\text{Non-supplemented population}}$ Ho: Δ NOR $_{\text{Supplemented population}} \geq \Delta$ NOR $_{\text{Non-supplemented population}}$ Ho: Δ NRR $_{\text{Supplemented population}} \geq \Delta$ NRR $_{\text{Non-supplemented population}}$	Spawning escapement and spawning origin composition of supplemented and non-supplemented (reference) populations.
2. Maintain run timing, spawn timing, and spawning distribution of endemic populations.	Ho: Migration timing $_{\text{Hatchery}}$ = Migration timing $_{\text{Naturally produced}}$ Ho: Spawn timing $_{\text{Hatchery}}$ = Spawn timing $_{\text{Naturally produced}}$ Ho: Redd distribution $_{\text{Hatchery}}$ = Redd distribution $_{\text{Naturally produced}}$	Monitor and evaluated supplemented and non supplemented (reference) population run-timing, spawn timing and redd distribution.

3. Maintain endemic population genetic diversity, population structure, and effective population size Additionally, determine if hatchery programs have caused changes in phenotypic characteristics of natural populations.	Ho: Allele frequency $_{Hatchery}$ = Allele frequency $_{Naturally\ produced}$ = Allele frequency $_{Donor\ pop.}$ Ho: Genetic distance between subpopulations $_{Year\ x}$ = Genetic distance between subpopulations $_{Year\ y}$ Ho: Δ Spawning Population = Δ Effective Spawning Population Ho: Age at Maturity $_{Hatchery}$ = Age at Maturity $_{Naturally\ produced}$ Ho: Size at Maturity $_{Hatchery}$ = Size at Maturity $_{Naturally\ produced}$	Periodic (each 5 years) genetic analysis of hatchery and naturally adult and juvenile fish in the supplemented population and natural origin fish in the non-supplemented population. Monitor and evaluate run timing, spawn timing, redd distribution, size and age at maturity, and effective population size of supplemented and non-supplemented populations.
4. Achieve/maintain adult-to-adult survival (i.e., hatchery replacement rate) that is greater than the natural adult-to-adult survival (i.e., natural replacement rate) and equal to or greater than the program specific HRR expected value based on survival rates listed in the BAMP (1998).	Ho: HRR $_{Year\ x}$ > NRR $_{Year\ x}$ Ho: HRR ≥ Expected value per assumptions in BAMP	Monitor and evaluate hatchery and natural adult-to-adult replacement rate in the supplemented populations.
5. Maintain the stray rate of hatchery fish below the acceptable levels to maintain genetic variation between stocks.	Ho: Stray rate $_{Hatchery\ fish}$ < 5% of total brood return Ho: Stray hatchery fish < 5% of spawning escapement of other independent populations. Ho: Stray hatchery fish < 10% of spawning escapement of any non-target streams within independent population.	Monitor and evaluate hatchery stray rates and proportional contribution to natural spawning aggregates.
6. Provide release of hatchery fish consistent with programmed size and number.	Ho: Hatchery fish $_{Size}$ = Programmed $_{Size}$ Ho: Hatchery fish $_{Number}$ = + 10% of Programmed $_{Number}$	Monitor fish size and number at release.
7. Maintain the proportion of hatchery fish on the spawning grounds at a levels that minimize negative affects to freshwater productivity (i.e., number of smolts per redd) of supplemented streams when compared to non-supplemented streams with similar adult seeding levels.	Ho: Δ smolts/redd $_{Supplemented\ population}$ > Δ smolts/redd $_{Non\text{-}supplemented\ population.}$	Monitor and evaluate annual smolt production in supplemented and non-supplemented populations. Monitor and evaluate redd deposition in supplemented and non-supplemented populations.

8. Provide no significant increase in incidence of BKD in the natural and hatchery populations.	Ho: Conc. $_{BKD}$ supplemented fish $_{Time\ x}$ = Conc. $_{BKD}$ supplemented fish $_{Time\ x}$ Ho: Conc. $_{BKD}$ supplemented stream $_{Time\ x}$ = Conc. $_{BKD}$ non-supplemented stream $_{Time\ x}$ Ho: Conc. $_{BKD}$ hatchery effluent $_{Time\ x}$ = Conc. $_{BKD}$ hatchery effluent $_{Time\ x}$ Ho: Conc. $_{BKD}$ supplemented stream $_{Upstream\ Time\ x}$ = Conc. $_{BKD}$ hatchery effluent $_{Time\ x}$ = Conc. $_{BKD}$ supplemented stream $_{Downstream\ Time\ x}$ Ho: Hatchery disease $_{Year\ x}$ = Hatchery disease $_{Year\ y}$	Perform diagnostic disease investigations in the hatchery population and natural population, in supplemented and non-supplemented streams.
9. Minimize adverse impacts to non-target taxa of concern (NTTOC).	Ho: NTTOC abundance $_{Year\ x\ through\ y}$ = NTTOC abundance $_{Year\ y\ through\ z}$ Ho: NTTOC distribution $_{Year\ x\ through\ y}$ = NTTOC distribution $_{Year\ y\ through\ z}$ Ho: NTTOC size $_{Year\ x\ through\ y}$ = NTTOC size $_{Year\ y\ through\ z}$	

1.10.1 Risks:

Performance Standards	**Performance Indicators**	**Monitoring and Evaluation**	
1. Artificial propagation activities comply with ESA responsibilities to minimize impacts and/or interactions to ESA listed fish	Project complies with Section 10 permit conditions including juveniles are raised to yearling smolt-size (10 fish/lb). All fish are adipose fin clipped and CWT to identify them from naturally produced fish.	As identified in the HGMP: Monitor size, number, date of release and mass mark quality. Additional WDFW projects: straying, instream evaluations of juvenile and adult behaviors, NOR/HOR ratio on the spawning grounds, fish health documented. Required data are generated through the M & E plan and provided to NOAA Fisheries as required per annual report compliance.	
2. Ensure hatchery operations comply with state and federal water quality and quantity standards through proper environmental monitoring.	All facilities meet WDFW water right permit compliance and National Pollution Discharge Elimination System (NPDES) requirements. WAG-5011.	Flow and discharge reported in monthly NPDES reports. Environmental monitoring of total suspended solids, settle-able solids, in-hatchery water temperatures, in-hatchery dissolved oxygen, nitrogen, ammonia, and pH will be conducted and reported as per permit conditions.	
3. Water intake systems minimize impacts to listed wild salmonids and their habitats.	Water withdrawal – permits have been obtained to establish water rights for each hatchery facility. Intake screens – designed and operated to assure approach velocities and operating conditions provide protection to wild salmonid species.	Intake system designed to deliver permitted flows. Operators monitor and report as required Hatcheries participating in the programs will maintain all screens associated with water intakes in surface water areas to prevent impingement, injury, or mortality to listed salmonids.	

4. The risk of catastrophic fish loss due to hatchery facility or operation failure is minimized.	Staffing allows for rapid response for protection of fish from risk sources (water loss, power loss, etc.). Backup generators to provide an alternative source of power to supply water during power outages. Protocols in place to test standby generator and all alarm systems on a routine basis. Multiple rearing sites or footprints for captive broodstock rearing. Alarm systems installed and operating at each rearing vessel to detect loss of or reduced flow and reduced operating head in rearing vessels. Densities at minimum to reduce risk of loss to disease. Sanitation – all equipment is disinfected between uses on different lots of fish including nets, crowders, boots, raingear, etc.	Hatchery engineering design and construction accommodate security measures. Operational funding accommodates security measures. Training in proper fish handling, rearing, and biological sampling for all staff. Staff are trained to respond to alarms and operate all emergency equipment on station. Maintenance is conducted as per manufacturer's requirements and according to hatchery maintenance schedules.
5. Artificial production facilities are operated in compliance with all applicable fish health guidelines, facility operation standards and protocols including IHOT, Co-managers Fish Health Policy and drug usage mandates from the Federal Food and Drug Administration	Hatchery goal is to prevent the introduction, amplification or spread of fish pathogens that might negatively affect the health of both hatchery and naturally reproducing stocks and to produce healthy smolts that will contribute to the goals of this facility.	Pathologists from WDFW's Fish Health Section monitor program monthly. Exams performed at each life stage may include tests for virus, bacteria, parasites and/or pathological changes, as needed
6. The risk of catastrophic fish loss due to hatchery facility or operation failure is minimized.	Staffing allows for rapid response for protection of fish from risk sources (water loss, power loss, etc.). Backup generators to provide an alternative source of power to supply water during power outages. Protocols in place to test standby generator and all alarm systems on a routine basis. Multiple rearing sites or footprints for captive broodstock rearing. Alarm systems installed and operating at each rearing vessel to detect loss of or reduced flow and reduced operating head in rearing vessels. Densities at minimum to reduce risk of loss to disease. Sanitation – all equipment is disinfected between uses on different lots of fish including nets, crowders, boots, raingear, etc.	Hatchery engineering design and construction accommodate security measures. Operational funding accommodates security measures. Training in proper fish handling, rearing, and biological sampling for all staff. Staff are trained to respond to alarms and operate all emergency equipment on station. Maintenance is conducted as per manufacturer's requirements and according to hatchery maintenance schedules.
7. Broodstock collection and juvenile hatchery releases minimize ecological effects on listed wild fish.	Summer chinook reared to sufficient size such that smoltification occurs within nearly the entire population, reducing residence time in streams after release (CV length ≤ 10%, condition factor 0.9 – 1.0).	Fish culture and evaluation staff monitor behavior, coefficient of variation in length, and condition. Fish health specialists will certify all hatchery fish before release. Downstream juvenile smolt traps can

	All listed fish encountered in hatchery broodstock collection operations will be held for a minimal duration in the traps; generally less than 24 hrs and follow permit protocols. Listed fish trapped in excess of broodstock collection goals will be released upstream or returned to natal streams immediately. Smolts acclimated and imprinted on surface water from the natal steam to enhance smoltification and reduce residence time in the tributaries and mainstem migration corridors.	be used to monitor the outmigration of hatchery and wild fish. Outmigration may also be monitored through PIT tag detection systems at mainstem passage facilities. Broodstock collection protocols will developed each season and reviewed by the HCP Hatchery committees.	

1.11.1 Proposed annual broodstock collection level (maximum number of adult fish).

Up to 556 adults are hauled from Wells Dam for an egg take goal of approximately 1,251,000 (FBD 2005).

1.11.2 Proposed annual fish release levels (maximum number) by life stage and location.

Transfer goal is 425,000 fish to Carlton Pond and 600,000 fish to the Similkameen River system in order to meet production goals below.

Age Class	Max. No.	Size (ffp)	Release Date	Location			
				Stream	Release Point (RKm)	Major Water-shed	Eco-province
Yearling	400,000	10	Mid-April	Methow River (Carlton Pond)	RKm 56.4	Methow	Columbia Cascade
Yearling **	576,000 *	10	Mid-April	Similkameen River (Similkameen Pond)	RKm 3.1	Okanogan	Columbia Cascade
* 100,000 of this portion can be made to Bonaparte Acclimation Pond on the Okanogan River.				Okanogan River (Bonaparte Pond)	RKm 90.2	Okanogan	Columbia Cascade

1.12 Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.

Okanogan System: The summer/fall Chinook destined for the Okanogan River has recently experienced a substantial increase. From runs of under 5,000 fish passing Wells Dam, returns since 2001 have ranged from about 40,000 to 69,000 adults. The proportion of hatchery-origin fish in the naturally spawning population is substantial ranging from just under 50% in the lower runs of recent years to over 70% in the last few larger runs. The smolt-to-adult return rate for the Similkameen rearing pond has averaged 0.74 for brood years 1989 through 1997, ranging from 0.009-3.17.

In the Columbia River, ocean-type chinook salmon released as yearlings have consistently survived better than those released as sub-yearlings In the Columbia River, the benefits of rearing juveniles through a yearling stage include (1) improved passage through hydroelectric dams, through coincidental timing of releases with increased flows and spill (Raymond 1988); (2) better fish guidance efficiency of yearlings at the dams because of behavioral and buoyancy changes (Giorgi et al. 1988); (3) decreased susceptibility to predators (Poe et al. 1991); and (4) improved swimming performance of larger smolts (Park 1969). Based upon smolt production numbers to necessary to achieve hatchery compensation objectives, the difference in production required between yearling and sub-yearling ocean-type chinook salmon is on the order of 0.24. In other words, for every 1,000 sub-yearling summer chinook smolts to be produced for compensation, 240 yearling smolts could be produced in lieu of the sub-yearlings. This ratio was derived from observed differences in survival between yearling and sub-yearling releases from Wells FH. The appropriate mix of yearling and sub-yearling smolts has been evaluated through the Mid Columbia Hatchery Plan to minimize the risk of this increased hatchery production on the existing natural production. For adult production, see also HGMP Section 3.3.1. Recent returns have increased the amount of spawning escapement of summer chinook (Table 3).

SARs:
Smolt to adult survival rates for summer/fall chinook produced in WDFW hatchery programs within the region have been estimated to range from 0.07 % to 3.62 %, averaging 1.49 % (smolt to adult overall survival estimates for brood year 1982-87 for Rocky Reach Hatchery releases from Chapman et al. 1994). It is assumed that current program will have similar performance of SAR, and provide harvestable numbers according to the settlement agreements. SARs for yearling releases have been increasing in the late 1990's (Table 1). A comparison of other summer chinook programs of yearling releases are provided in Table 2.

Table 1. Data available for fingerling and yearling SARs to brood year 1999. Data from the APRE website and RMIS (1998 & 1999).

Brood Year	Methow (Carlton Pond) Releases	Okanogan (Similkameen Pond) Releases
	Smolt to Adult Survival (%) 0+	Smolt to Adult Survival (%)
1989	NA	2.00
1990	0.10	0.27
1991	0.03	0.30
1992	0.04	0.42
1993	0.03	0.03
1994	0.17	0.70
1995	0.06	0.47
1996	0.02	0.009
1997	0.16	3.17
1998	1.82	2.63
1999	.005*	27*

2000	Na	Na
2001	Na	Na
2002	Na	Na
2003	Na	Na

*Preliminary numbers only.

Table 2. Estimated survival rates for WDFW summer yearling smolt releases from Wells, Turtle Rock, Wenatchee, Methow and Okanogan River systems. Years 1976-1989 are taken from the Mid- Columbia Hatchery Plan (BAMP 1998) with recent data through BY 1999 derived from RMIS.

Hatchery	Age at Release	Release years	Release years survival rate (%)	Brood Years 1995 – 1999	Release years survival rate (AVG %)
Wells	1+	1976-1989	0.410	0.40 (1995) 0.46 (1996) 2.78 (1997) 2.19 (1998) 0.39 (1999)*	1.244%
Rocky Reach (Turtle Rock)	1+	1984-1989	1.366	0.69 (1995) 0.76 (1996) 2.35 (1997) 2.57 (1998) 0.65 (1999)*	1.404%
Methow River (Carlton Pond)	1+	Na	Na	0.06 (1995) 0.03 (1996) 0.16 (1997) 1.82 (1998) 0.005 (1999)*	0.383%
Similka-meen Pond	1+	Na	Na	0.48 (1995) 0.009 (1996) 3.17 (1997) 2.63 (1998) 0.27 (1999)*	1.297%
Wenat-chee (Dryden Pond)	1+	Na	Na	0.22 (1995) 0.09 (1996) 1.84 (1997) 1.12 (1998) 0.18 (1999)*	0.69%

* Preliminary numbers only.

Escapement:

Returns to the upper Columbia to Wells Dam have been increasing recently and reflected in the escapement to the Methow and Okanogan River systems (Table 4). The most recent five-year average annual escapement for summer chinook at wells dam is 38,807. This compares with a 5 year average of only 4,027 for 1989-1993 and a 5 year average of 4,832 for the period from 1994-1998 (Table 3).

Table 3. Methow/Okanogan Escapement from 1989 – 2003 based on adult escapement over Wells Dam.

Return Year	Number of Adults	Return Year	Number of Adults
1989	4,800	1998	5,316
1990	4,160	1999	10,336
1991	2,892	2000	13,443
1992	3,491	2001	47,314
1993	4,795	2002	69,311
1994	8,001	2003	53,632
1995	4,238	2004	NA
1996	3,307	2005	NA
1997	3,298		

Table 4. Upper Columbia natural summer chinook spawning escapement estimates (return years 1979-2004 from WDF and WDFW 1995 - 2004). Peak number of summer chinook redds estimates or counted during spawning surveys on the Wenatchee, Methow, Okanogan and Similkameen Rivers

Year	**Wenatchee**	**Methow**		**Okanogan**		**Similkameen**	
	Spawning Estimates	Aerial	Ground	Aerial	Ground	Aerial	Ground
1980	8,995	345	-	118	-	172	-
1981	4,515	195	-	55	-	121	-
1982	4,113	142	-	23	-	56	-
1983	3,937	65	-	36	-	57	-
1984	8,420	162	-	235	-	301	-
1985	9,185	164	-	138	-	309	-
1986	10,021	169	-	197	-	300	-
1987	9,831	211	-	201	-	164	-
1988	10,389	123	-	113	-	191	-
1989	12,764	126	-	134	-	221	370
1990	9,343	229	-	88	47	94	147
1991	7,144	-	153	55	64	68	91
1992	9,312	-	107	35	53	48	57
1993	7,469	-	154	144	162	152	288
1994	8,006	-	310	372	375	463	777
1995	6,178	-	357	260	267	337	616
1996	4,879	-	181	100	116	252	419
1997	4,719	-	205	149	158	297	486
1998	3,984	-	225	75	88	238	276
1999	4,376	-	448	222	369	903	1,275
2000	4,448	-	500	384	549	549	993
2001	9,142	-	675	883	1,108	865	1,540
2002	Na	-	2,013	1,958	2,667	2,000	3,358
2003	Na	-	1,624	1,099	1,035	103	378
2004	Na	-	973	1,310	1,327	2,127	1,660
2005							

1.13 Date program started (years in operation), or is expected to start.

The first year of operation for this hatchery was 1990. Hatchery production of summer chinook in the region has been continuous since implementation of the Grand Coulee Fish Maintenance Project

(GCFMP), with several USFWS hatcheries constructed beginning in 1941 on the Wenatchee, Entiat, and Methow Rivers (Waknitz et al. 1995). The WDFW hatcheries currently producing summer chinook smolts were constructed in the mid-1960s (Turtle Rock), 1967 (Wells), 1989 (Eastbank), and 1990 (Similkameen Pond, Dryden Pond, and Carlton Pond).

1.14 Expected duration of program.

The supplementation program will continue with the objective of mitigating for the loss of summer chinook salmon productivity caused by hydroelectric dams in the Columbia River Basin; in particular the Rock Island, Rocky Reach, and Wells hydroelectric projects.

1.15 Watersheds targeted by program.

The targeted watersheds are tributary to the upper Columbia River (WRIA 48-0001). The summer/fall Chinook programs target the Okanogan and Similkameen rivers and the upper Columbia River below Chief Joseph Dam.

1.16 Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

METHOW SUMMER CHINOOK

1.16.1 OVERVIEW

Methow summer chinook hatchery program level is a 400,000 yearling program released at 10 fish per pound (FPP). The program is the result of mitigation agreements for Rock Island Dam. The goal of the program is to supplement the natural population utilizing locally adapted broodstock. Fish are reared on well water at Eastbank FH and transferred to Carlton Pond in the spring for acclimation on Methow River water. Limited capital expenditures and inadequate hatchery facilities, associated with broodstock origin, disease segregation, and long term acclimation, have been the prominent issues with this program.

Currently broodstock are collected from the east ladder of Wells Dam as part of the Methow/Okanogan summer chinook program at Eastbank FH. Prior to 1996 adults were held and spawned at Wells FH and the eggs subsequently sent to Eastbank FH for incubation and rearing. Since 1996 adults have been taken to Eastbank FH to maintain separation from the Wells volunteer program). As a result this has put an additional burden on water and space resources at Eastbank FH.

Methow summer chinook in some years must be reared according to enzyme linked immunosorbant assay (ELISA) determinations to minimize the risk of large-scale loss to bacterial kidney disease (BKD). Under this program design the current juvenile facilities are inadequate to rear and acclimate fish at the appropriate densities according to their respective health risk. As such, conditions pose a much greater health risk than would normally be encountered. Currently there is no ability to acclimate fish on surface water in a long-term manner. The result is lower than achievable smolt to adult survival and significant decrease in homing fidelity back to the Methow River Basin.

1.16.2 POTENTIAL ALTERNATIVES

Alternative #1. Without adequate rearing and acclimation space to accommodate segregation by disease risk as well as long term over-winter acclimation, the program will continue to see less than optimal smolt to adult survival as well decreased homing fidelity to the Methow River Basin.

Construct adult collection facility on the lower end of the Methow River to acquire local broodstock. Modify Carlton Pond to allow segregated acclimation of all summer chinook regardless of ELISA risk. Develop a water source(s) to provide long term over winter acclimation (October through May) to improve imprinting and minimize straying. Construct additional acclimation pond(s) in the upper basin to distribute returning spawner effort more equally throughout the basin. Additional sites should also have over-winter capability. A tributary trapping facility on the Methow River can be used for steelhead, spring chinook, and coho as well. The facility would, as an ancillary benefit, provide a means by which to determine escapement of each of the fore mentioned species.

Pros: Divided acclimation ponds as well as over winter acclimation locations higher in the Methow River Basin would result in a lower incidence of straying as well as producing a higher quality smolt that survives to adult at a higher rate.

Cons: Tributary trapping may pose significant health risks to certain stocks with respect to the hatcheries ability to inoculate adults for BKD within a two-week period prior to fish maturing. Rearing higher disease risk progeny on surface water may increase the probability of disease outbreaks.

1.16.3 POTENTIAL REFORMS AND INVESTMENT

INVESTMENT OR REFORM 1

Determine the run timing of wild summer chinook into the Methow and Okanogan rivers to determine feasibility of acquiring adults from the tributaries in a manner consistent with WDFW fish health guidelines for disease treatment and inoculation. Radio tagging wild adult at the east ladder of Wells Dam with receiver stations at several locations in the lower Methow River would provide information for tributary specific trapping operations. A tributary specific trap is necessary to acquire adults that have those attributes that provide the greatest survival/homing potential to maintain stock distinctiveness within the Methow River basin (i.e., locally adapted broodstock).

COST ESTIMATE

Unknown cost.

INVESTMENT OR REFORM 2

Long term acclimation facilities and the ability to rear all segregated groups would maximize survival rates and flexibility in hatchery rearing. Higher survival benefits have been observed in this stock when long-term overwinter acclimation was provided. Long-term acclimation facilities would also reduce the well water requirements at hatcheries that could be used for other stocks.

COST ESTIMATE

Unknown cost.

OKANOGAN SUMMER CHINOOK

1.16.4 OVERVIEW

Okanogan summer chinook hatchery program level is a 572,000 yearling program released at 10 fish per pound (FPP). The program is the result of mitigation agreements for Rocky Reach and Rock Island Dam. The goal of the program is to supplement the natural population utilizing locally adapted broodstock. Fish are reared on well water at Eastbank FH and transferred to Similkameen Pond in October for acclimation on Similkameen River water. Limited capital expenditures and inadequate hatchery facilities, associated with broodstock origin, disease segregation, and additional acclimation, have been the prominent issues with this program.

Currently broodstock are collected from the east ladder of Wells Dam as part of the Methow/Okanogan summer chinook program at Eastbank FH. Prior to 1996 adults were held and spawned at Wells FH and the eggs subsequently sent to Eastbank FH for incubation and rearing. Since 1996 adults have been taken to Eastbank FH to maintain separation from the Wells volunteer program. As a result this has put an additional burden on water and space resources at Eastbank FH.

Okanogan summer chinook in some years must be reared according to enzyme linked immunosorbant assay (ELISA) determinations to minimize the risk of large-scale loss to bacterial kidney disease (BKD). Under this program design the current juvenile facilities are inadequate to rear and acclimate fish at the appropriate densities according to their respective health risk. As such, conditions pose a much greater health risk than would normally be encountered.

1.16.5 POTENTIAL ALTERNATIVES

ALTERNATIVE 1

Without adequate rearing and acclimation space to accommodate segregation by disease risk as well as additional long term over-winter acclimation in locations lower in the basin, the program will continue to experience extremely high spawner densities in selected areas of the Okanogan River Basin.

ALTERNATIVE 2 (WDFW endorsed)

Construct adult collection facility or develop a technique(s) to capture broodstock for the Okanogan River from throughout the run. Construct additional acclimation facilities lower in the Okanogan River Basin to decrease the spawner density and redd superimposition in the Similkameen and upper Okanogan River. Modify Similkameen Pond to allow segregated acclimation of all summer chinook regardless of ELISA risk.

Pros: Locally adapted broodstock is the goal for supplementation programs. Use of the correct donor stock is an important component in propagating fish with the appropriate survival traits. A tributary trapping facility on the Okanogan River can also be used for collecting steelhead and spring chinook.

Divided acclimation ponds as well as acclimation ponds lower in the Okanogan River Basin would reduce redd superimposition and ensure all spawning habitat was fully seeded. A single large acclimation pond does not allow for any flexibility in rearing groups of fish at different sizes or health risks (e.g., Similkameen Pond). Long-term acclimation ponds (e.g., Similkameen Pond) have also been responsible for some of the highest smolt to adult survival rates of all the hatchery programs in the upper Columbia Basin.

Cons: Tributary trapping may pose significant health risks to certain stocks with respect to the hatcheries ability to inoculate adults for BKD within a two week period prior to individuals maturing. Rearing higher disease risk progeny on surface water may increase the probability of disease outbreaks.

1.16.6 POTENTIAL REFORMS AND INVESTMENT

Determine the run timing of wild summer chinook into the Methow and Okanogan rivers to determine feasibility of acquiring adults from the tributaries in a manner consistent with WDFW fish health guidelines for disease treatment and inoculation. Radio tagging wild adult at the east ladder of Wells Dam with receiver stations at several locations in the lower Okanogan River would provide information for tributary specific trapping operations. A tributary specific trap is necessary to acquire adults that have those attributes that provide the greatest survival/homing potential to maintain stock distinctiveness within the Okanogan River basin (i.e., locally adapted broodstock).

COST ESTIMATE

Unknown cost.

INVESTMENT OR REFORM 2

Long-term acclimation facilities in the lower Okanogan River and the ability to rear all segregated groups would maximize survival rates and flexibility in hatchery rearing. Higher survival benefits have been observed in this stock when long-term over-winter acclimation was provided. Long-term acclimation facilities would also reduce the well water requirements at hatcheries that could be used for other stocks.

Program alternatives were considered in an analysis of strategic options (Smith 2001). The current summer/fall Chinook program at Similkameen Pond is not consistently returning sufficient fish to provide for adequate C&S harvest by the Colville Tribes in locations where such harvest can occur. Additional hatchery-origin fish are required to provide greater harvesting opportunities for the Colville Tribes who lost much of their historical fishing grounds with the construction of Grand Coulee and Chief Joseph dams. Remaining fisheries have been closed or severely limited by ESA constraints and ongoing passage mortalities associated with nine PUD and COE dams on the Columbia River. The Similkameen Pond program is insufficient mitigation for the fishery losses caused by the PUD and Federal dams. The Colville Tribes are working to increase their harvesting capacity by testing and developing selective fishing gear. The Similkameen program alone will be insufficient to supply the salmon for the Tribes' intended C&S fisheries. Sufficient hatchery-origin fish must also be available to supply a selective, recreational fishery. In spite of the most recent high returns of summer/fall Chinook into the Columbia Cascade Province, supplementation with hatchery-origin fish is required to maintain and increase the abundance and distribution of the population given the long-term, poor trend in this population. Considerable, historical Chinook spawning habitat is underutilized or unused with the current Similkameen program.

Okanogan Summer/Fall Chinook

1.16) Indicate alternative actions considered for attaining program goals, and reasons why these actions are not being proposed.

1.16.1) Brief Overview of Key Issues

The Colville Tribes have submitted an Okanogan River Summer/Fall Chinook HGMP that describes comprehensive Integrated Recovery and Integrated Harvest programs. This HGMP includes the existing program at Similkameen Pond. Key features of the HGMP are:

1. Develop a local, Okanogan River summer/fall Chinook broodstock.
2. Inclusion of Chinook from throughout the entire run in the broodstock.
3. Use additional acclimation sites to disperse Chinook throughout their range to fully utilize historical habitats.
4. Develop live-capture, selective fisheries to maximize recreational and tribal C&S harvest and to manage the proportion of hatchery-origin fish in the naturally spawning population.
5. Increase the opportunity and stability of tribal C&S and recreational fisheries.
6. Construct additional production facilities near Chief Joseph Dam.

1.16.2) Potential Alternatives to the Current Program

Alternative 1: Adopt the Okanogan River Summer/Fall Chinook HGMP as the single summer/fall Chinook management plan for the Okanogan River. This HGMP provides a comprehensive management plan for summer/fall Chinook in the Okanogan subbasin. It includes the current WDFW program at Similkameen Pond (with suggested reforms), new initiatives to improve population viability, and new initiatives to increase recreational and tribal C&S fishing. The HGMP is the basis for development of a Step-1 Master Plan that will be submitted to the Northwest Power and Conservation Council in 2004. Approval of the Master Plan will lead to implementation of the HGMP and its reform initiatives.

1.16.3) Potential Reforms and Investments

Reform/Investment 1: Implement the Okanogan River Summer/Fall Chinook HGMP. If the Master Plan is approved in 2004, this program will be implemented through the Council's provincial review process following successful completion of steps 2 and 3. Conceptual engineering design of the acclimation facilities and Chief Joseph Dam Hatchery is currently in progress. Cost: $0. This program is already being developed through the Council's Provincial Review Process.

Section 2: Program Effects on ESA-Listed Salmonid Populations

2.1 List all ESA permits or authorizations in hand for the hatchery program.

WDFW has the following permits for hatchery operations in the Upper and Mid-Columbia:

Section 10(a)(1)(B) Permit Number 1347 Permit Type: Incidental take of upper Columbia spring chinook and steelhead resulting from the propagation of unlisted sockeye, summer and fall chinook at Eastbank, Wells, Priest Rapids, Lake Wenatchee sockeye, and cooperative releases. Expires October 22, 2013.

Section 10(a)(1)(B) Permit Number 1196 Permit Type: Artificial production of upper Columbia spring chinook. Expires Dec 31, 2007. Activities described in the application for this permit have been authorized under terms and conditions of the Biological Opinion on Artificial Propagation in the Columbia River Basin (NMFS 1999).

Section 10(a)(1)(B) Permit Number: 1395 Permit Type: Direct Take (artificial propagation of listed steelhead) authorizes the WDFW, the Chelan PUD, and the Douglas PUD annual take of ESA listed adult and juvenile, endangered, naturally produced and artificially propagated, UCR steelhead and UCR spring chinook salmon associated with the implementation of UCR steelhead artificial propagation enhancement programs in the UCR region. The programs are intended to supplement naturally spawning UCR steelhead production occurring upstream from Priest Rapids Dam on the mainstem Columbia River, including the Wenatchee, Methow, and Okanogan Rivers, and their tributaries. Expires October 2, 2013.

Section 10(a)(1)(B) Permit Number: **1248 Permit Type:** Incidental take of ESA-listed anadromous fish species associated with seven recreational fishery programs to be conducted above Priest Rapids Dam on the Columbia River. This permit expired at the end of 2004 and is being renewed to include all fisheries above the Highway 395 Bridge in Pasco. This permit was submitted to NOAA for a renewal March 16, 2005 and is awaiting approval.

Section 10(a)(1)(B) Permit Number: 1482 (1203) Authorizes the take of ESA-listed upper Columbia River salmon and steelhead associated with research activities in the upper Columbia River Basin. This permit was modified in 2004 and the issue date is pending NOAA approval.

<u>Authorizations</u>

FERC processes:
Under current settlement agreements and stipulations, the three mid-Columbia PUDs pay for the operation of hatchery programs within the Columbia Cascade Province. These programs determine the levels of hatchery production needed to mitigate for the construction and continued operation of the PUD dams.

Habitat Conservation Plans:
In 2002, habitat conservation plans (HCPs) were signed by Douglas and Chelan PUDs, WDFW, USFWS, NOAA Fisheries, and the Colville Confederated Tribes. The overriding goal of the HCPs are to achieve no-net impact1 on anadromous salmonids as they pass Wells (Douglas PUD), Rocky Reach, and Rock Island (Chelan PUD) dams. One of the main objectives of the hatchery component of NNI is to provide species specific hatchery programs that may include contributing to the rebuilding and recovery of naturally reproducing populations in their native habitats, while maintaining genetic and ecologic integrity, and supporting harvest.

Biological Assessment and Management Plan:
The biological assessment and management plan (BAMP) was developed by parties negotiating the HCPs in the late 1990s. The BAMP was developed to document guidelines and recommendations on methods to

determine hatchery production levels and evaluation programs. It is used within the HCP as a guiding document for the hatchery programs.

2.2.1 Descriptions, status and projected take actions and levels for ESA-listed natural populations in the target area.

Identify the NMFS ESA-listed population(s), that will be directly affected by the program.
None.
Identify the NMFS ESA-listed population(s), that may be directly affected by the program.

Upper Columbia River ESU spring chinook (*Oncorhynchus tshawytscha*). All spring chinook in the Upper Columbia ESU were listed as Endangered under the ESA. Listed as an endangered species on March 24, 1999.

Upper Columbia River ESU summer steelhead trout (*Oncorhynchus mykiss).* The Upper Columbia River (UCR) Steelhead ESU was listed as Endangered on August 18, 1997. NOAA Fisheries is currently reviewing this listing in light of the decision to include hatchery produced UCR steelhead in the ESU. The final determination for this and nine other *O. mykiss* ESUs is expected in December of 2005.

Bull Trout populations (*Salvelinus confluentus*). Columbia River Distinct Population Segment) On June 12, 1998 bull trout in the Upper Columbia Distinct Population Segment (DPS) were listed as threatened under federal ESA by the USFWS.

Other salmonid species -
Sockeye salmon in the region were judged as neither in danger of extinction or likely to become so in the foreseeable future by NMFS in the west coast sockeye salmon species status review (Gustafson et al. 1997).

Other ESA-listed species of significance to the summer chinook programs include those that originate in other watersheds within the Columbia River Basin: Middle Columbia River ESU steelhead - “threatened”; Snake River ESU sockeye - “endangered”; Snake River ESU spring chinook - “threatened”; Snake River ESU fall chinook - “threatened”; Snake River ESU steelhead - “threatened”; Lower Columbia River ESU chinook - “threatened”; Lower Columbia River ESU chum - “threatened”; Lower Columbia River ESU steelhead - “threatened”; and Lower Columbia/Southwest Washington ESU coastal cutthroat - “threatened”.

2.2.2 Status of ESA-listed salmonid population(s) affected by the program.

Describe the status of natural population relative to critical and viable population thresholds.
Critical habitat was designated for UCR spring chinook salmon and UCR steelhead in 2000 when NMFS published a final rule in the Federal Register (February 16, 2000 65 FR 7764). However, the critical habitat designations were vacated and remanded to NMFS for new rulemaking pursuant to a court order in April 2002. The designation of critical habitat for the UCR spring chinook salmon ESU or UCR steelhead ESU will trigger a re-initiation of ESA consultation.

- **Provide the most recent 12 year (e.g. 1988-present) progeny to parent ratios, survival data by life stage, or other neasures of productivity for the listed population. Indicate sources of these data.**
- **Provide the most recent 12 year (e.g. 1988-present) estimates of annual spawning abundance estimates, or any other abundance information. Indicate sources of these data.**
- **Provide the most recent 12 year (e.g. 1988-present) estimates of annual proportions of direct hatchery origin and listed natural origin fish on the natural spwning grounds, if known. Indicate sources of these data.**

Sources for these sections are taken from the Section 10 Direct Take Permit (#1395, #1196), WDFW

Application for Permits # 1395 and #1196 and ESA Section 7 Consultations for Permit # 1395 – 2002, and #1196 - 1998).

Upper Columbia River ESU summer steelhead: The ESU includes naturally-spawned populations of steelhead in tributaries of the Columbia River upstream from the Yakima River, including the Okanogan River. The Wells Hatchery stock steelhead were included in the listed ESU. Critical habitat for the ESU was designated on February 16, 2000 and included all river reaches accessible to listed steelhead (and associated riparian zones) in Columbia River tributaries between the Yakima River and Chief Joseph Dam (NPPC 2001). Survival of natural-origin steelhead has been severely depressed such that 81% of the natural spawning escapement is hatchery-origin fish (Busby 1996 as quoted in Bugert 1998). The Wells Hatchery steelhead stock is considered essential for recovery, and is included in the listing. Since 1997, the WDFW has been developing a Wenatchee River stock for the juvenile released into the Wenatchee basin. Currently, there is probably a close resemblance between the natural and hatchery populations in this ESU because of the incorporation of naturally-spawning adults into the hatchery program and the large number of hatchery fish that have been spawning in the natural environment (65-80 percent of the spawning population in the Methow basin; Busby *et al.* 1996). Since natural replacement rates of UCR steelhead are low (0.3:1), the hatchery supplementation programs were determined to be essential for recovery and included in the endangered listing under the ESA. These hatchery fish could be used to reduce the short-term risk of extinction and aid in the recovery of the UCR steelhead ESU.

Although the life history of this ESU is similar to that of other inland steelhead, smolt ages are some of the oldest on the west coast (up to 7 years old), probably due to the ubiquitous cold water temperatures (Mullan *et al.* 1992). Adult steelhead from this ESU enter the lower Columbia between May and September with fish arriving at Wells Pool in early July. Fish enter the Wenatchee and Methow Rivers in mid-July and peak between mid-September and October. During winter, adult steelhead generally return to the warmer Columbia River and re-enter the Methow to begin spawning in mid-March after the ice has thawed. Spawning continues through May and many fish seek out higher reaches in the tributaries. Fry emergence occurs that summer and juveniles rear for two to four years prior to spring downstream migration. On April 4, 2002, NOAA Fisheries defined interim abundance recovery targets for each spawning population in this ESU (Table 5). These targets are intended to represent the number and productivity of naturally produced spawners that may be needed for recovery, in the context of whatever take or mortality is occurring. They should not be considered in isolation, as they represent the numbers that, taken together, may be needed for the population to be self-sustaining in its natural ecosystem. For UCR steelhead, the interim recovery levels are 2,500 spawners in the Wenatchee River, 500 spawners in the Entiat River, and 2,500 spawners in the Methow River (Table 5).

Table 5. Interim abundance targets of naturally produced steelhead by basin and approximate natural origin broodstock collection goal.

Basin	Interim Abundance Target	Broodstock Goal
Wenatchee	2,500	at least 104 [a]
Entiat	500	- -
Methow	2,500	maximum 123 [b]
Okanogan	600	16
Small Tributaries	200	- -
Total	**6,300**	**243**

[a] *Proportional to run-at-large in years when run is composition is 50% or greater natural origin steelhead, otherwise goal is 50% naturally produced steelhead. Total broodstock collection goal is generally about 208 steelhead..*

[b] *Combined WDFW Methow/Okanogan programs will not exceed 30% natural origin steelhead in the broodstock. Up to 373 steelhead may be collected for broodstock total.*

Returns of both hatchery and naturally produced steelhead to the UCR basin have increased in recent years. The average 1997-2001 return counted through the Priest Rapids Dam fish ladder was approximately 12,900 fish. The average for the previous five years (1992-1996) was 7,800 fish. Abundance estimates of returning naturally produced UCR steelhead have been based on extrapolations from mainstem dam counts and associated sampling information (e.g.,hatchery/natural fraction, age composition). The natural component of the annual steelhead run over Priest Rapids Dam increased from an average of 1,040 (1992-1996), representing about 15 percent of the total adult count, to 2,200 (1997-2001), representing about 17 percent of the adult count during this period of time (BRT 2003). In terms of natural production, recent population abundances for both the Wenatchee/Entiat river aggregate population and the Methow population remain well below the interim recovery levels developed for these populations (BRT 2003). A 5-year geometric mean (1997-2001) of approximately 900 naturally produced steelhead returned to the Wenatchee and Entiat rivers (combined) compared to a combined abundance target of 3,000 fish. Although this is well below the interim recovery target, it represents an improvement over the past (an increasing trend of 3.4 percent per year). However, the average percentage of natural fish for the recent 5-year period dropped from 35 to 29 percent, compared to the previous status review. For the Methow population, the 5-year geometric mean of natural returns over Wells Dam was 358. Although this is well below the interim recovery target, it represents an improvement over the past (an increasing trend of 5.9 percent per year). In addition, the estimated 2001 return (1,380 naturally produced spawners) was the highest single annual return in the 25-year data series. However, the average percentage of natural origin spawners dropped from 19 percent for the period prior to the 1998 status review to 9 percent for the 1997 to 2001 returns. Naturally produced steelhead made up an average of 17.8 percent of the steelhead run at Priest Rapids Dam during the 18-year period from 1986 to 2001. These natural origin steelhead are not equally distributed among the UCR tributary basins. Mullen *et al*. (1994) reported annual escapement to the Methow basin at only 10 percent natural origin steelhead; however, in recent years the WDFW (2002) report natural origin steelhead composition of 5 to 11 percent in 1998 through 2000 at Wells Dam. The escapement to the Wenatchee basin from 1998 to 2000 averages 430 natural origin steelhead.

The average 2000- 2003 return counted through the Priest Rapids Dam fish ladder was approximately 18,620 fish with 3049 wild fish. The 1997-2001 return counted through the Priest Rapids Dam fish ladder was approximately 12,900 fish. The average for the previous five years (1992-1996) was 7,800 fish. By October 2004, over 18,000 steelhead had passed Priest Rapids Dam by early October. The natural component of the annual steelhead run over Priest Rapids Dam increased from an average of 1,040 (1992-1996), representing about 15 percent of the total adult count, to 2,200 (1997-2001), representing about 17 percent of the adult count during this period of time (BRT 2003). In terms of natural production, recent population abundances for both the Wenatchee/Entiat river aggregate population and the Methow population remain well below the interim recovery levels developed for these populations (BRT 2003).

Upper Columbia River ESU Spring Chinook:

The UCR spring chinook salmon ESU, listed as endangered on March 24, 1999 (64 FR 14308), includes all natural-origin stream-type chinook salmon from river reaches above Rock Island Dam and downstream of Chief Joseph Dam, including the Wenatchee, Entiat, and Methow River Basins (Myers *et al.* 1998). All stocks, with the exception of the Methow stock, were considered by WDF *et al.* (1993) to be of native origin, of natural production type, and as depressed in status. When listing the UCR spring chinook salmon as endangered, NMFS included six hatchery populations as part of the ESU: Chewuch River, Methow River, Twisp River, Chiwawa River, White River, and Nason Creek. These six hatchery populations were considered to be essential for recovery and were therefore listed as part of the ESU. Hatchery populations that were derived from Carson spring chinook salmon stock at Leavenworth, Entiat and Winthrop National Fish Hatcheries were not included as part of the ESU.

NMFS has proposed Interim Recovery Abundance Levels and Cautionary Levels (Ford *et al.*2001). Cautionary Levels were characterized as natural origin abundance levels that the population fell below only about 10 percent of the time during a historical period when it was considered to be relatively healthy. The three independent populations of spring chinook salmon identified for the ESU include those that spawn in the Wenatchee, Entiat, and Methow Basins (Ford *et al.* 2001).

All three of the existing UCR spring chinook salmon naturally reproducing populations have exhibited similar downward trends and patterns in abundance over the past 40 years (NMFS 2003c, 2003d, 2003e). Assuming that population growth rates were to continue at 1980-2000 levels, UCR spring chinook salmon populations are projected to have very high probabilities of 90 percent decline within 50 years (87 to 100 percent). Redd counts in the three basins have improved in recent years, largely because of natural spawning by artificially propagated spring chinook salmon (Grassell 2003; Grassell 2004; Mosey and Murphy 2002; Hamstreet and Carie 2004; Humling and Snow 2004). Artificially propagated juvenile spring chinook salmon are released into the Chiwawa River with the expectation that as adults they will return and spawn in the Chiwawa River. In reality, these hatchery released fish have contributed an average of 50 percent of the spawners in the Chiwawa River and an average of 25 percent of the spawners in Nason Creek (Andrew Murdoch, WDFW, pers. com.). The propagation program spring chinook salmon that return to spawn in Nason Creek are considered strays and of potential adverse risk to the Nason Creek component of the population; measures to improve the fidelity of hatchery reared spring chinook salmon to the Chiwawa River are being explored. Additionally, a new artificial propagation program that releases locally derived juveniles into Nason Creek is likely to occur within the next five years. The reproductive effectiveness of these hatchery-origin salmon is not known at this time. However, preliminary indications in the Wenatchee River Basin suggest that the Chiwawa spring chinook salmon program is contributing to natural reproduction in successive generations (Andrew Murdoch, WDFW, pers. com.). Successful reproduction over generations has not been demonstrated for the other basins as yet. A summary of recent redd count data and spawner composition is provided in Table 10. All three of the existing UCR spring chinook salmon naturally reproducing populations have exhibited similar downward trends and patterns in abundance over the past 40 years (NMFS 2003c, 2003d, 2003e). Assuming that population growth rates were to continue at 1980-2000 levels, UCR spring chinook salmon populations are projected to have very high probabilities of 90 percent decline within 50 years (87 to 100 percent). Redd counts in the three basins have improved in recent years, largely because of natural spawning by artificially propagated spring chinook salmon (Grassell 2003; Grassell 2004; Mosey and Murphy 2002; Hamstreet and Carie 2004; Humling and Snow 2004). Artificially propagated juvenile spring chinook salmon are released into the Chiwawa River with the expectation that as adults they will return and spawn in the Chiwawa River. In reality, these hatchery released fish have contributed an average of 50 percent of the spawners in the Chiwawa River and an average of 25 percent of the spawners in Nason Creek (Andrew Murdoch, WDFW, pers. com.). The propagation program spring chinook salmon that return to spawn in Nason Creek are considered strays and of potential adverse risk to the Nason Creek component of the population; measures to improve the fidelity of hatchery reared spring chinook salmon to the Chiwawa River are being explored. Additionally, a new artificial propagation program that releases locally derived juveniles into Nason Creek is likely to occur within the next five years. The reproductive effectiveness of these hatchery-origin salmon is not known at this time. However, preliminary indications in the Wenatchee River Basin suggest that the Chiwawa spring chinook salmon program is contributing to natural reproduction in successive generations (Andrew Murdoch, WDFW, pers. com.). Successful reproduction over generations has not been demonstrated for the other basins as yet.

While some improvement can be seen in recent years, the ESU is still at critically low levels compared to both historic production and the desired escapement levels—particularly for natural fish. Therefore, while there is some cause for guarded optimism, NMFS finds that there has been no genuine change in the species' status since they were listed as endangered, and the biological requirements are not being met with respect to abundance, distribution, or overall trend.

Provide the most recent 12-year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for the listed population. Indicate the source of these data.

UCR Spring Chinook:
The NRR for the Wenatchee, Entiat, and Methow populations has ranged from 1.4 to 0.4 from 1958 to 1995 broodyears. The NRR has not been above 1.0 since the mid-1970's for the Wenatchee and Methow populations and the mid-1980's for the Entiat population (Ford et al., 2001). Even with planned increases in mainstem juvenile passage survival anticipated from the Habitat Conservation Plan, additional survival of 20 to 50% is necessary to achieve NRR greater than 1.0 (Cooney, 2000 Draft). UCR Spring Chinook are extinct in the Okanogan River basin.

UCR Steelhead: The Natural Return Ratios (NRR) or wild adult-to-adult survival rates for the Methow/Okanogan populations have been estimated as between 0.05 – 0.35 from 1975 to 1991. For the Wenatchee/Entiat populations, the NRR are estimated to have ranged from 0.1 – 0.9 during this same time (Ford et al., 2001). The Biological Requirements Committee concluded that the UCR steelhead populations are not able to sustain themselves naturally, but it is not clear if they would go extinct without ongoing supplementation. The uncertainty surrounding the reproductive success of hatchery steelhead confounds these analyses. Even with planned increases in mainstem juvenile passage survival anticipated from the Habitat Conservation Plan, additional survival of 20 to 50% is necessary to achieve NRR greater than 1.0 (Cooney, 2000 Draft).

In areas above Priest Rapids Dam, several methods have been used to estimate the number of steelhead spawners and juveniles that the available habitat may be capable of supporting. These estimates for the UCR basin range from 1,603 to 8,281 depending on the estimation method (Ford *et al*. 2001). The Interior Columbia Basin Technical Recovery Team (TRT) is reviewing the available data and is expected to provide escapement recommendations for recovery of all ESA-listed UCR species. The WDFW proposes to manage artificially propagated steelhead at levels above the interim abundance targets developed by NMFS (Lohn 2002) until the TRT recommendations are available. NMFS has not developed abundance targets for the Okanogan basin or other smaller tributaries.

Wild production -
The population status of listed steelhead smolts produced in the region has been estimated by WDFW (L. Brown, WDFW pers. comm). The number of steelhead juveniles that may be produced are indicated by the following subbasin production capacities for wild steelhead smolts in the region (WDF et al. 1993;

MCMCP 1997):

- Wenatchee 62,167
- Entiat 12,739
- Methow 58,552
- Okanogan 17,570
- Total 151,028

Recent ten-year (1987-96) average seeding levels estimated for the region indicate potential wild smolt production at 109.5% of the modeled production capacities (MCMCP 1997):

- Wenatchee 73,371
- Entiat 10,728
- Methow 65,586
- Okanogan 15,660
- Total 165,345

Provide the most recent 12 year (e.g. 1988-present) annual spawning abundance estimates, or any other abundance information. Indicate source of these data.

UCR Steelhead:

Table 6. Upper Columbia River steelhead run composition at Wells Dam (Methow and Okanogan basins) (Letter from Kirk Truscott, WDFW, July 9, 2003).

	Artificially Propagated		Naturally Produced		
Year	Number	Percent	Number	Percent	Total Run
1998	2,849	92%	234	8%	3,083
1999	3,511	89%	447	11%	3,958
2000	6,142	92%	541	8%	6,683
2001	18,034	95%	889	5%	18,923
2002	9,098	93%	706	7%	9,804

Wenatchee and Entiat Rivers

Between 1967 and 2003, an average of 761 naturally produced steelhead spawned in the Wenatchee River (range; 70-2,864). In the Entiat River, spawning escapement has ranged from 9 to 366, averaging 97 fish. The 12-year geometric mean of spawners in the Wenatchee River has ranged from 185 to 919, and is currently (2003) 716 (Table 8). For the Entiat River, the 12-year geometric mean has ranged from 24 to 118 and is currently 92. The returning number of fish to both tributaries is auto-correlated since they were derived from the same aggregate. Therefore, the return per spawner is reported for both populations combined. In the Wenatchee and Entiat rivers, the return per spawner has averaged 1.42 (range; 0.13-4.73) if hatchery fish produce the equivalent number of returning spawners as naturally produced fish, and averages 0.28 (range; 0.05-0.79) if hatchery fish do not produce any returning spawners. The 12-year geometric mean of the return per spawner has averaged 1.22 (range 0.71-1.96) if hatchery fish are equivalents to naturally produced fish, or 0.26 (0.18-0.32) if they do not contribute (Table 7).

Table 7. Summary statistics for determining naturally produced (NP) steelhead escapement and run reconstruction for the Wenatchee and Entiat Rivers

	Stlhd. Passed	% NP	NP Escapement		NP escpmt.		GEO-M NP escpmt.		Returns		Return per spawner for Wenatchee and Entiat			
				> harvest & presp.									GEO-M	GEO-M
	(RI-WLS)	Wen., Ent.	<hrvst.	mortality	Wen.	Ent.	Wen.	Ent.	Wen.	Ent.	H. eff. = 0	effect. = 1	H. eff. = 0	H. eff. = 1
1984	8,464	0.17	1463	919	683	87	220	28	1883	241	2.76	0.43	1.96	0.32
1985	12,132	0.21	2515	1859	1382	177	257	33	1406	180	1.02	0.19	1.91	0.32
1986	9,582	0.21	1967	1770	1315	168	323	41	1011	129	0.77	0.20	1.66	0.30
1987	7,239	0.41	2980	2682	1993	255	416	53	723	92	0.36	0.16	1.40	0.28
1988	4,840	0.33	1588	1430	1062	136	482	62	1125	144	1.06	0.36	1.37	0.29
1989	4,751	0.53	2507	2256	1676	214	538	69	536	69	0.32	0.18	1.31	0.30
1990	3,131	0.28	888	800	594	76	604	77	524	67	0.88	0.26	1.22	0.29
1991	3,176	0.49	1550	1395	1036	133	669	86	432	55	0.42	0.26	1.08	0.29
1992	5,451	0.23	1241	1117	830	106	761	97	485	62	0.58	0.15	0.90	0.25
1993	2,335	0.32	759	683	507	65	784	100	437	56	0.86	0.28	0.81	0.23
1994	3,457	0.20	704	634	471	60	919	118	301	39	0.64	0.13	0.79	0.22
1995	3,233	0.31	1006	906	673	86	919	117	369	47	0.55	0.18	0.71	0.22
1996	3,177	0.19	588	529	393	50	877	112	1111	142	2.82	0.56	0.71	0.22
1997	3,619	0.17	614	552	410	52	793	101	1941	248	4.73	0.74	0.81	0.25
1998	1,979	0.21	408	367	273	35	696	89						
1999	2,765	0.24	663	597	443	57	614	78						
2000	4,236	0.42	1789	1610	1196	153	620	79						
2001	10,084	0.42	4284	3855	2864	366	648	83						
2002	5,817	0.33	1931	1738	1291	165	691	88						
2003	17,481	0.28	2375	2137	1588	203	716	92						
Avg.:	**4,825**	**0.29**	**1,352**	**1,024**	**761**	**97**	**534**	**68**	**643**	**82**	**1.42**	**0.28**	**1.22**	**0.26**
Min.:	**1,305**	**0.14**	**196**	**94**	**70**	**9**	**185**	**24**	**110**	**14**	**0.13**	**0.05**	**0.71**	**0.18**
Max.:	**17,481**	**0.80**	**4,284**	**3,855**	**2,864**	**366**	**919**	**118**	**1,941**	**248**	**4.73**	**0.79**	**1.96**	**0.32**

RI-WLS Rock Island dam to Wells Dam; Wen = Wenatchee, Ent = Entiat; Stlhd = Steelhead; hrvst = harvest; escpmt = escapement; Geo-M = Geometric mean; H. eff = Hatchery Effective

Data from the Upper Columbia Salmon Recovery Plan June 2005 Draft.

UCR Spring Chinook

Table 8. Estimates of the number of natural-origin spring chinook returning to subbasins for each independent population of Upper Columbia River spring chinook salmon and preliminary Interim Recovery Abundance and Cautionary levels.

Year	Subbasin		
	Wenatchee River	Entiat River	Methow River
1979	1,154	241	554
1980	1,752	337	443
1981	1,740	302	408
1982	1,984	343	453
1983	3,610	296	747
1984	2,550	205	890
1985	4,939	297	1,035
1986	2,908	256	778
1987	2,003	120	1,497
1988	1,832	156	1,455
1989	1,503	54	1,217
1990	1,043	223	1,194
1991	604	62	586
1992	1,206	88	1,719
1993	1,127	265	1,496
1994	308	74	331
1995	50	6	33
1996	201	28	126
1997	422	69	247
1998	218	52	125
1999[1]	119	64	73
2000	*1,295*	*180*	*811*
1996-2000 average	451	79	276
Recovery Abundance	**3,750**	**500**	**2,000**
Cautionary Abundance	**1,200**	**150**	**750**

[1] Estimates for 1999 are preliminary; estimates for 2000 (italics) are based on the preseason forecast (actual return data not available 10/17/00).

Provide the most recent 12 year (e.g. 1988-present) estimates of annual proportions of direct hatchery origin and listed natural origin fish on the natural spwning grounds, if known. Indicate sources of these data.

UCR Steelhead:

See Table 6.

UCR Spring chinook:

Table 9. Annual total redd counts and proportion of artificially propagated to natural origin spring chinook salmon by tributary basin (Andrew Murdoch, WDFW, pers. comm.).

	Return Year								
Basin	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
					Redd Count				
Wenatchee Basin [a]									
Chiwawa River	82	13	23	82	39	34	128	1,046	
Nason Creek	27	7	33	55	29	8	100	367	
White River	3	2	12	15	5	1	8	93	
Entiat Basin	34	13	20	37	24	27	73	202	112
Methow Basin									
Twisp River	32	4	0	32	0	7	99	370	109
Chewuch River	27	2	0	55	0	6	20	1,037	301
Methow River	64	9	0	56	0	17	232	2,828	722
					Proportion of Hatchery to Natural Origin Spawners [b]				
Wenatchee Basin [a]									
Chiwawa River	0.40	0.05	0.43	0.70	0.56	0.33	0.56	0.74	
Nason Creek	0.23	0	0.33	0.63	0.19	0	0.24	0.61	
White River	0	0	0	0	0	0	0	0.21	
Entiat Basin [c]	0	0	0.20	??	0	0	0.58	0.25	0.18
Methow Basin									
Twisp River	0	0	0	0.25	0	0.64	0.96	0.33	027
Chewuch River	0.29	0	0	0.33	0	0.64	0.42	0.64	087
Methow River	.014	0	0	0.37	0	0.39	0.91	0.95	0.95

[a] *Areas upstream of Tumwater Dam*

[b] *Based on coded-wire tag recoveries*

[c] *Minimum values, some carcasses were of unknown origin*

Activities approved through Section 10 Incidental Take Permit 1347 authorizes the WDFW, the Chelan PUD, the Douglas PUD annual incidental take of adult and juvenile, endangered, naturally produced and artificially propagated, UCR spring chinook salmon and UCR steelhead of ESA-listed species associated with the implementation of non-ESA-listed salmon artificial propagation programs in the UCR region. The programs are intended to supplement naturally spawned unlisted summer chinook salmon, fall chinook salmon, and sockeye salmon (*O. nerka*) production occurring upstream from the vicinity of

Priest Rapids Dam on the mainstem Columbia River, including the mainstem Columbia River and the Wenatchee, Methow, and Okanogan Rivers and their tributaries.

Unlisted salmon artificial propagation program activities will include:

- The collection of broodstock through trapping operations at: Wells Dam for Methow and Okanogan River summer chinook salmon populations, Wells Hatchery for summer chinook salmon releases from Wells and Turtle Rock hatcheries, Dryden and Tumwater Dams for Wenatchee River summer chinook salmon and Wenatchee sockeye salmon, and Priest Rapids Hatchery for Priest River hatchery-origin fall chinook salmon.
- The holding and artificial spawning of collected adults at Wells, Eastbank, and Priest Rapids Hatcheries, and Lake Wenatchee Net Pens.
- The incubation and propagation from the fertilized egg through the fingerling, pre-smolt or smolt life stage at the Wells, Eastbank, and Priest Rapids Hatchery complex facilities.
- The transfer of summer chinook salmon and sockeye salmon fingerlings or pre-smolts from the hatcheries for rearing at facilities in the Wenatchee, Methow, and Okanogan Rivers' watersheds, and to net-pens in Lake Wenatchee.
- The release of summer chinook salmon, fall chinook salmon, and sockeye salmon smolts into the Wenatchee, Methow, and Okanogan Rivers' basins, and into the mainstem Columbia River from the hatcheries, acclimation ponds, and net-pens on those systems.
- The monitoring and evaluation of these artificial propagation programs in the natural environment through activities such as redd counts and carcass surveys, and formal monitoring and evaluation plans to be developed by the HCP Hatchery Committees as called for in the HCPs.

Trapping Operations: The collection of summer chinook broodstock occurs at: Wells Dam for Methow and Okanogan River summer chinook salmon populations, Wells Hatchery for summer chinook salmon releases from Wells and Turtle Rock hatcheries, Dryden and Tumwater Dams for Wenatchee River summer chinook salmon and Wenatchee sockeye salmon, and Priest Rapids Hatchery for Priest River hatchery-origin fall chinook salmon. As run-of-the-river operations, the three summer chinook broodstock trapping programs may lead to the direct take of co-migrating listed species, including Upper Columbia River ESU steelhead, Upper Columbia River ESU spring chinook, and Columbia River population segment bull trout. Direct takes of these listed species at these traps are authorized through Section 10 direct take permits #1395 (steelhead) and # 1395 (spring chinook), and under a Section 6 cooperative management agreement with the USFWS (bull trout). Risk aversion measures associated with the trapping operations are detailed in WDFW permit applications for these authorizations and within the permits themselves. No other portions of the summer chinook program are expected to lead to the direct take of listed fish. The Wells Dam left and right bank ladder traps, and the Wells Hatchery trap, operate from early May through November to collect spring chinook, summer chinook, and steelhead broodstock. Water loss is not considered a risk factor for fish held in the traps, as the ladders are supplied with water passing through Wells Dam.

Methow and, to a lesser extent, Okanogan river system wild steelhead may be encountered at the Wells Salmon Hatchery in the Wells Dam left and right bank ladder traps, and at the hatchery trap during spring chinook, summer chinook, and fall chinook broodstock procurement operations from early May through November. In 1996, the Wells Hatchery staff captured and passed upstream 17 adult steelhead during spring chinook brood collection between mid-May and early July (H. Bartlett,
WDFW, pers. comm. June, 1997). An additional 19 adult wild steelhead were collected in 1996 at Wells between mid-July and late October, when both summer chinook and steelhead are trapped for use as broodstock. These latter steelhead, although not lacking adipose fins, are thought to be hatchery-origin or of hatchery lineage, and were retained as broodstock for the Wells complex hatchery program. We estimate that an annual total of 30-40 steelhead are encountered during salmon broodstock collection efforts within the Wells Dam ladders each year (K. Petersen, WDFW, pers. comm. June 1997). All

steelhead encountered that are not retained as broodstock, as authorized by Permit #1094, move through the traps with no significant handling or delay. Run timing of spring chinook and summer chinook are somewhat distinct. No other chinook populations are present in the project area during the July-August summer chinook broodstock collection period.

Genetic and Ecological Effects on Natural Populations: The genetic risks to naturally produced populations from artificial propagation include reduction in the genetic variability (diversity) among and within populations, genetic drift, selection, and domestication which can contribute to a loss of fitness for the natural populations (Hard *et al.*1992; Cuenco *et al.* 1993; NRC 1996; and Waples 1996). The risk of adverse genetic effects to the population is diminished by operating the adult collection between the dates of June 28 and August 28 to exclude spring-run and fall-run chinook from collections. ESA-listed spring chinook which may be incidentally trapped after June 28 can usually be distinguished from the recently arriving summer chinook by external coloration and body conformation. Unless needed for authorized recovery program broodstock, listed spring chinook thus identified will be passed upstream with minimal delay. Measures to reduce sources of bias that could lead to a non-representative sample of the desired Methow/Okanogan basin summer chinook brood stock sources include trapping all fish randomly from the run at large and throughout the duration of passage to ensure proportional representation of the age and size structure of the returning population. Additional measures employed to reduce the risk of adverse genetic effects to the population is a collection date beginning no earlier than June 28 and ending no later than August 28 to exclude spring-run and fall-run chinook from collections. Hatchery summer chinook volunteering to the hatchery trap can be separated by origin through CWT analysis. This process will allow differentiation between Carlton, Similkameen, and Wells hatchery-origin fish (as well as out-of-basin strays) prior to spawning and maintenance of separate local broodstocks for each production area as necessary.

Competition, predation, cannibalism, and residualism:
Direct competition for food and space between hatchery and natural fish may occur in spawning and/or rearing areas, the migration corridor, and in ocean habitat. These impacts are assumed to be greatest in the spawning and nursery areas and at points of highest fish density (release areas) and to diminish as hatchery smolts disperse (USFWS 1994). Competition for space and cover in the Methow and Ojkanogan River probably occurs between hatchery and natural fish shortly after release and during downstream migration, but based on the smolt travel times the duration of interaction is minimal in the river (WDFW 1998a). Rearing and release strategies at all WDFW salmon and steelhead hatcheries are designed to limit adverse ecological interactions through minimizing the duration of interaction between newly liberated hatchery salmon and steelhead and naturally produced fish. Competition continues to occur at some unknown, but probably lower, level as smolts move downstream through the migration corridor (NMFS 1995). Release of large numbers of pre-smolts in a small area is believed to have greater potential for competitive effects because of the extended period of interaction between hatchery fish and natural fish. Release of hatchery smolts that are physiologically ready to migrate is expected to minimize competitive interactions as they should quickly migrate out of the spawning and rearing areas. Rearing and release strategies are designed to limit the amount of ecological interactions occurring between hatchery and naturally produced fish. Fish are reared to sufficient size such that smoltification occurs within nearly the entire population, which reduces retention time in the streams after release (Bugert et al. 1991). Rearing on parent river water, or acclimation for several weeks to parent river water, also contributes to the smoltification process and reduced retention time in the streams. Adult hatchery fish that stray to natural spawning areas, rather than return to the hatchery, may also be competing for spawning gravel. However, when spawning populations are at depressed levels, the degree of this impact should be small: there is thought to be a relationship between high spawner density and greater egg loss in the natural environment (Chebanov 1991). Stray hatchery adults may also breed with native fish, potentially altering genetic fitness and influencing their ability to survive in the ecosystem . Hatchery fish may prey upon natural fish. Due to their location, size, and time of emergence, newly emerged

chinook salmon fry are likely to be the most vulnerable to predation by hatchery released fish. Their vulnerability is believed to be greatest as they emerge and decreases somewhat as they move into shallow, shoreline areas (USFWS 1994). migration out of hatchery release areas and foraging inefficiency of newly released hatchery smolts may minimize the degree of predation on chinook salmon fry (USFWS 1994). Rearing and acclimation pond management strategies in the Mid-Columbia Hatchery Program will be designed to reduce impacts to natural fish. Predation by hatchery fish on natural-origin smolts is less likely to occur than predation on fry. USFWS (1994) presented information indicating salmonid predators are generally thought to prey on fish approximately 1/3 or less their length. Coho salmon and chinook salmon, after entering the marine environment, generally prey upon fish one-half their length or less and consume, on average, fish that is less than one-fifth their length (Brodeur 1991). Consequently, predation by hatchery fish on natural salmon and steelhead smolts in the migration corridor is believed to be low. In general, predation on natural fish may be reduced by using appropriate fish cultural practices. Hatchery fish may prey upon listed fish. Due to their location, size, and time of emergence, newly emerged Chinook salmon fry are likely to be most vulnerable to predation by hatchery released fish. Their vulnerability is believed to be greatest as they emerge and decreases somewhat as they move into shallow, shoreline areas (USFWS 1994). Emigration out of hatchery release areas and foraging inefficiency of newly released hatchery smolts may minimize the degree of predation on Chinook salmon fry (USFWS 1994). Hatchery salmonids that do not emigrate after release are said to have residualized. These fish that residualize can adversely affect naturally produced fish through competition and predation. Chinook salmon though do not tend to residualize (Groot and Margolis 1991).

Disease Transmission:

Disease interactions between hatchery fish and listed fish in the natural environment may be a source of pathogen transmission. Because the pathogens responsible for diseases are present in both hatchery and natural-origin populations, there is some uncertainty associated with determining the extent of disease transmission from hatchery fish (Williams and Amend 1976; Håstein and Lindstad 1991). To address concerns of potential disease transmission from hatchery to natural fish, the Pacific Northwest Fish Health Protection Committee (PNFHPC) has established guidelines to ensure hatchery fish are released in good condition, thus minimizing impacts to natural fish (PNFHPC 1989). Also, the IHOT (1995) developed detailed hatchery practices and operations designed to prevent the introduction and/or spread of any fish diseases with the Columbia River Basin. Interactions between hatchery-origin and natural-origin fish can be a source of pathogen transmission. As most pathogens responsible for diseases are present in both hatchery origin and natural-origin fish, there is uncertainty in the extent to which hatchery-origin fish transmit diseases. Because of the normally high densities that fish are reared in hatcheries and the associated stresses, these fish are, however, more susceptible to disease outbreaks (Bugert 1998). The rearing densities in the acclimation ponds (Similkameen, Bonaparte, or Tonasket) should be much lower than standard propagation limits thereby reducing the opportunity for disease outbreaks. The volitional release strategy for these ponds should also minimize crowding of hatchery origin and natural-origin fish in the Methow, Okanogan and Columbia rivers, reducing the potential for disease transmission. As outlined in this HGMP, standard disease monitoring, treatment, and certification will all be occurring to minimize the opportunity for disease transmission.

Monitoring:

Associated monitoring Activities:

The monitoring and evaluation of these artificial propagation programs in the natural environment through activities such as redd counts and carcass surveys, and formal monitoring and evaluation plans are to be developed by the HCP Hatchery Committees as called for in the HCPs. WDFW as per permit conditions will be submitting annual reports that will detail these activities.

Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).

Take Description and Levels are covered under Incidental Take Permit 1347 (artificial propagation of unlisted salmon). Incidental takes of ESA-listed species associated with broodstock collection activities, hatchery operations, and juvenile fish releases from the program are authorized.

Hatchery activities are covered under Incidental take Permit 1347 for unlisted salmon propagation program activities including:

- The collection of broodstock through trapping operations at: Wells Dam for Methow and Okanogan River summer chinook salmon populations, Wells Hatchery for summer chinook salmon releases from Wells and Turtle Rock hatcheries, Dryden and Tumwater Dams for Wenatchee River summer chinook salmon and Wenatchee sockeye salmon, and Priest Rapids Hatchery for Priest River hatchery-origin fall chinook salmon.
- The holding and artificial spawning of collected adults at Wells, Eastbank, and Priest Rapids Hatcheries, and Lake Wenatchee Net Pens.
- The incubation and propagation from the fertilized egg through the fingerling, pre-smolt or smolt life stage at the Wells, Eastbank, and Priest Rapids Hatchery complex facilities.
- The transfer of summer chinook salmon and sockeye salmon fingerlings or pre-smolts from the hatcheries for rearing at facilities in the Wenatchee, Methow, and Okanogan Rivers' watersheds, and to net-pens in Lake Wenatchee.
- The release of summer chinook salmon, fall chinook salmon, and sockeye salmon smolts into the Wenatchee, Methow, and Okanogan Rivers' basins, and into the mainstem Columbia River from the hatcheries, acclimation ponds, and net-pens on those systems.
- The monitoring and evaluation of these artificial propagation programs in the natural environment through activities such as redd counts and carcass surveys, and formal monitoring and evaluation plans to be developed by the HCP Hatchery Committees as called for in the HCPs

Because of the inherent biological attributes of aquatic species, such as salmon and steelhead, the dimensions and variability of the Columbia River system and tributaries, and the operational complexities of hatchery actions, determining precise incidental take levels of ESA-listed species attributable to the hatchery activities is not possible at present. The existence of concurrent WDFW broodstock collection programs for listed steelhead at Wells Dam, Dryden Dam, and Tumwater Dam (previously authorized by NMFS through Section 10 direct take Permit 1395), and for listed spring chinook salmon at Tumwater Dam (previously authorized by NMFS through Section 10 direct take Permit 1196), further complicates the ability to identify incidental take occurring through the unlisted salmon programs. Indirect takes from hatchery releases such as predation and competition is highly uncertain and dependant on a multitude of factors (i.e. data for population parameters - abundance, productivity and intra species competition) and although HGMPs discuss our current understanding of these effects, it is not feasible to determine indirect take (genetic introgression, density effects, disease, competition, predation) due to these activities. Estimated annual levels of take or take tables for these activities cannot be submitted with this document.

Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.

Any additional mortality from this operation that deviates from permit conditions or take levels would be communicated to NOAA Fisheries per permit conditions (#1347).

Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.
Annual Progress Reports as a condition of Section 10 permit compliance are provided from WDFW to NOAA Fisheries for past takes associated with the Section 10 permit (#1347).

Section 3: Relationship of Program to Other Management Objectives

3.1 Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the *NPPC Annual Production Review* Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.

A comprehensive ESU-wide plan for the propagation of UCR summer/fall Chinook does not exist. Fishery co-managers have prepared a draft "Biological Assessment and Management Plan, Mid-Columbia River Hatchery Program" (Bugert 1998). This conceptual artificial production plan (BAMP) was developed as a component of a Mid-Columbia Habitat Conservation Plan, but has not yet been formally agreed upon and adopted. Production increases are to be consistent with conservation of low risk, natural populations and recovery of listed species. A phased approach is to be used to minimize deleterious effects of collecting broodstocks upon natural populations and to allow monitoring of program development.

The summer chinook production programs are fully consistent with standards and guidelines set forth in the MCMCP's "Mid-Columbia Hatchery Plan" (BAMP 1998). The plan presents hatchery programs that have been jointly developed and, in most cases, agreed to by the parties to the MCMCP, which includes WDFW, NMFS, USFWS, Chelan and Douglas PUDs, and the Tribes.

The summer chinook artificial propagation program is a component of the Mid-Columbia Hatchery Program, a part of an application for a 50-year multi-species Habitat Conservation Plan (HCP) and relicensing agreement for the PUDs. This plan has two objectives: (1) to help recover natural populations throughout the Mid-Columbia Region so that they can be self-sustaining and harvestable, while maintaining their genetic and ecologic integrity; and (2) to compensate for a 7% mortality rate at each of the five PUD-owned mid-Columbia River mainstem dams (Wells, Rocky Reach, Rock Island, Wanapum, and Priest Rapids) in a manner that is consistent with the first objective. Through the regional hatchery plan, the summer chinook artificial production program has been integrated with harvest management objectives to provide run size enhancement and fishery benefits. Biological risks to listed species in the Columbia Basin posed by hatchery chinook releases, including predation, competition, and disease transfer, are expected to be minimal.

The program described in this HGMP is consistent with the following general agreements and plans:

- The Columbia River Fish Management Plan (CRFMP)
- *U.S. vs. Oregon* court decision
- Production Advisory Committee (PAC)
- Technical Advisory Committee (TAC)
- Integrated Hatchery Operations Team (IHOT) Operation Plan 1995 Volume III.
- Pacific Northwest Fish Health Protection Committee (PNFHPC)
- In-River Agreements: State, Federal, and Tribal representatives
- Northwest Power Planning Council Sub Basin Plans
- Washington Department of Fish and Wildlife (WDFW) Wild Salmonid Policy
- WDFW's Yearly Future Brood Document (FBD)

3.2 List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.

In 1988, under the authority of U.S. v. Oregon, the states of Washington, Oregon and Idaho, federal fishery agencies, and the treaty tribes agreed to the Columbia River Fish Management Plan (CRFMP), which was a detailed harvest and fish production process. There are no financial encumbrances tied to the process. Rather, the fish production section reflects current production levels for harvest management and recovery purposes, since up to 90% of the Columbia River harvest occurs on artificially produced fish. This Plan expired in 1998, and has had subsequent annual rollover of portions in which agreement has been reached. However, a newly negotiated CRFMP is forthcoming. Hatchery production programs in the upper Columbia sub-basins are included in the management plans created by the fishery co-managers identified in the treaty fishing rights case *United States v Oregon*. The parties to *U.S. v Oregon* include the four Columbia River Treaty Tribes – Yakama Nation, Warm Springs, Umatilla, and Nez Perce tribes, NOAA-Fisheries, U.S. Fish and Wildlife Service, and the states of Oregon, Washington, and Idaho. The Shoshone-Bannock Tribe is admitted as a party for purposes of production and harvest in the upper Snake River only. These parties jointly develop harvest sharing and hatchery management plans that are entered as orders of the court that are binding on the parties. The "relevant co-managers" described in the *U.S. v Orego*n management plans are, for the mid-Columbia sub-basins, the federal parties, Yakama Nation, and Washington Department of Fish and Wildlife.

In April 2002, negotiations on three Habitat Conservation Plans (HCPs) were concluded pursuant to section 10(a)(1)(B) of the ESA; *Anadromous Fish Agreement and Habitat Conservation Plan Wells Hydroelectric Project FERC1 License No. 2149* with Douglas PUD for the operation of Wells Dam (DPUD 2002), and *Anadromous Fish Agreement and Habitat Conservation Plan Rocky Reach Hydroelectric Project FERC License No. 2145* (CPUD 2002a) with Chelan PUD for the operation of Rocky Reach Dam, and *Anadromous Fish Agreement and Habitat Conservation Plan Rock Island Hydroelectric Project FERC License No. 943* with Chelan PUD for the operation of Rock Island Dam (CPUD 2002b). Biological Opinions with incidental take statements (ITSs) on the operation of each of the above hydroprojects have been issued consistent with the HCPs (NMFS 2003a, 2003b, 2003c). These HCPs are long term agreements between NMFS, the PUDs, the WDFW, the USFWS, the Colville Tribes, and other stakeholders. They provide the PUDs with some degree of certainty for the long-term operation of these projects and require the PUDs to provide mitigation in the form of a tributary fund for habitat improvement projects, and artificial propagation programs to mitigate for unavoidable loss of natural fish production due to habitat inundation and passage mortality at the projects. The HCPs were developed to protect five species of anadromous salmonids, including endangered UCR steelhead and UCR spring chinook salmon. The HCP agreements restrict the PUDs and NMFS from changing the artificial propagation production level during the period of this permit. The HCPs provide for HCP Hatchery Committees that may adjust the operation or implementation strategy of the programs based on new scientific data, changes in NMFS hatchery policy, or recommendations of the HCP Hatchery Committees.

The supplementation program, and the HGMP describing it, are consistent with the following agreements or plans:

- The Mid-Columbia Mainstem Conservation Plan - Hatchery Plan (BAMP 1998).
- The Rock Island Settlement Agreement (RISA 1989) between Chelan Public Utilities District, their power purchasers, and the joint fishery parties represented by Washington Department of fish and Wildlife and other state and federal fishery agencies and tribes.
- The Wells Settlement Agreement between Douglas PUD, their power purchasers, and the joint fishery parties represented by Washington Department of fish and Wildlife and other state and federal fishery agencies and tribes.
- The Rocky Reach Mitigation Agreement between the joint fishery parties and Chelan PUD, as modified in the late-1980s.

3.3 Relationship to harvest objectives.

Through the regional hatchery plan, the summer chinook artificial production program has been integrated with harvest management objectives to provide run size enhancement and fishery benefits. The summer chinook propagation program is a component of the Mid-Columbia Hatchery Program, a part of an application for a 50-year multi-species Habitat Conservation Plan (HCP) and relicensing agreement for the PUDs. This plan has two objectives: (1) to help recover natural populations throughout the Mid-Columbia Region so that they can be self-sustaining and harvestable, while maintaining their genetic and ecologic integrity; and (2) to compensate for a 7% mortality rate at each of the five PUD-owned mid-Columbia River main-stem dams (Wells, Rocky Reach, Rock Island, Wanapum, and Priest Rapids) in a manner that is consistent with the first objective. Through the regional hatchery plan, the summer chinook artificial production program has been integrated with harvest management objectives to provide run size enhancement and fishery benefits. Biological risks to listed species in the Columbia Basin posed by hatchery chinook releases, including predation, competition, and disease transfer, are expected to be minimal.

Okanogan summer/fall Chinook contribute in various amounts to fisheries along the West Coast from S.E. Alaska to the Columbia River. Prior to recent harvest restrictions implemented due to widespread listings of salmon species pursuant to the Endangered Species Act, summer Chinook were harvested at high rates in ocean fisheries of Alaska and British Columbia. With the increased runs of the past three years, recreational fishing and tribal treaty fisheries in the Columbia River have enjoyed increased harvests. In the past two years, recreational fishing in the Okanogan River has resumed. The Okanogan summer/fall Chinook provide the Colville Tribes' with their last remaining ceremonial and subsistence fishery of any magnitude. Average Tribal harvests have been consistently below 1,000 fish until the past few years when harvest has exceeded 3,000 Chinook.

Summer chinook from the region are only harvested incidentally in lower Columbia River fisheries directed at other species, and no directed commercial fisheries on upper Columbia summer-run fish have occurred in the main-stem since 1964 (BAMP 1998). Ceremonial and subsistence fisheries by the Colville Tribe in waters upstream of Rock Island Dam (mainly at the base of Chief Joseph Dam) harvest an average of 800 adults each year (1987-92 data from Chapman and al. 1994). The 1982-89 brood year average ocean fisheries exploitation rate is 39 %, with a total exploitation rate of 68 % estimated for the same years (Myers et al. 1998). Estimation of recent, past harvest rates for summer chinook originating in the region is complicated by changes in timing of the adult return of the Wells Hatchery group. As a consequence, Chapman et al. (1994) used only one brood year (1977) as the base for estimating pre-terminal exploitation rates for all subsequent brood years. The recent past (1975-87) mean exploitation rate for Wells Hatchery-origin summer chinook was estimated by Chapman et al (1994) to be about 40 %. Given fishery protection measures implemented in pre-terminal area, main-stem Columbia River and upper river tributaries to protect ESA-listed and depressed salmonid populations, future harvest rates on fish propagated by the program and on natural populations in the target area are expected to be lower than the mean level (40 %) estimated for the 1975-87 period.

3.3.1) Describe fisheries benefiting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

The fisheries benefiting from this program will include:
1) Ocean recreational and commercial fisheries from the mouth of the Columbia River north to S.E. Alaska
2) Columbia River Zone 1-5 commercial fishery
3) Columbia River Zone 1-6 recreational fishery
4) Columbia River Zone 6 tribal C&S and commercial fisheries

5) Mid-Columbia River recreational fisheries
6) Upper Columbia and Okanogan rivers Colville Tribal C&S fisheries
7) Upper Columbia and Okanogan rivers recreational fisheries

Methow (*Carlton Pond*) Summer CK Fisheries Contributions

Brood Year	Program Release #	# Of Fish Program Contributed	Proportion (%) of Total Catch									
			AK and Can. Commercial	OR, WA, WA treaty Troll	Col. R. Gillnet	NMFS Ground-Fish	AK and Can. Ocean Sport	WA Ocean Sport*	OR Ocean Sport	Fresh-Water Sport**	Treaty C&S	Misc. Fishery Contri. (<1%)
1990	540,000	142	41.7	9.0	4.0	6.0	3.2	0.0	0.0	0.0	36.1	0.0
1991	540,900	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1992	402,641	31	53.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	46.6	0.0
1993	433,375	51	40.9	0.0	8.4	0.0	18.4	0.0	0.0	0.0	32.4	0.0
1994	406,560	176	46.9	7.0	2.0	0.0	24.5	1.3	0.0	0.0	18.0	0.4
1995	353,182	59	36.7	22.0	2.5	0.0	38.8	0.0	0.0	0.0	0.0	0.0
1996	298,844	17	37.1	6.4	0.0	0.0	50.6	0.0	0.0	0.0	0.0	5.9
1997	384,909	257	81.1	2.3	1.3	0.0	0.0	2.8	2.8	8.2	0.0	1.6
1998	205,269	2,244	57.9	11.4	4.5	0.0	9.4	4.5	1.1	10.6	0.0	0.7
Average	**396,187**	**331**	**44.0**	**6.5**	**2.5**	**0.7**	**16.1**	**1.0**	**0.4**	**2.1**	**14.8**	**1.0**

*** Contains WA Buoy 10 fisheries. ** Combined WA and OR Columbia River and Col. R. Tributaries.**

Source: WDFW and RMIS

Okanogan (Similkameen) Summer CK Fisheries Contributions

Brood Year	Program Release #	# Of Fish Program Contributed to Fisheries	Proportion (%) of Total Catch									
			AK and Can. Commercial	OR, WA, WA treaty Troll	Col. R. Gillnet	NMFS Ground-Fish	AK and Can. Ocean Sport	WA Ocean Sport*	OR Ocean Sport	Fresh-water Sport**	Treaty C&S	Misc. Fishery Contribution (<1%)
1990	**540,000**	**391**	**74.1**	**0.0**	**2.0**	**0.0**	**13.7**	**0.0**	**0.0**	**3.0**	**7.3**	**0.0**
1991	**676,000**	**250**	**67.3**	**3.2**	**0.0**	**0.0**	**12.2**	**0.0**	**2.0**	**15.3**	**0.0**	**0.0**
1992	**548,000**	**483**	**63.2**	**9.0**	**1.1**	**3.8**	**15.4**	**0.0**	**0.0**	**2.1**	**5.2**	**0.4**
1993	**586,000**	**46**	**78.9**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**21.1**	**0.0**
1994	**536,000**	**992**	**64.1**	**6.5**	**2.1**	**0.0**	**20.3**	**0.0**	**0.0**	**1.8**	**4.2**	**1.0**
1995	**587,000**	**665**	**71.2**	**5.7**	**2.8**	**0.0**	**13.6**	**1.1**	**0.0**	**3.8**	**0.0**	**1.9**
1996	**507,913**	**3**	**100.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
1997	**590,000**	**7,469**	**67.8**	**10.0**	**1.7**	**0.0**	**10.2**	**2.0**	**1.1**	**5.5**	**0.0**	**1.7**
1999	**630,463**	**1,569**	**50.3**	**12.4**	**12.8**	**0.0**	**14.1**	**2.2**	**0.0**	**6.4**	**0.0**	**1.8**
Average	**577,931**	**1,319**	**70.7**	**5.2**	**2.5**	**0.4**	**11.1**	**0.6**	**0.3**	**4.2**	**4.2**	**0.8**

*** Contains WA Buoy 10 fisheries. ** Combined WA and OR Columbia River and Col. R. Tributaries.**

Source: WDFW and RMIS.

3.4 Relationship to habitat protection and recovery strategies.

Summer chinook salmon in the mid-Columbia Region are among the most electrophoretically homogenous populations in the state (BAMP 1998). The diversity of habitat they use however, is quite high. One goal of the summer chinook hatchery programs is to develop local adaptation to streams in the Mid-Columbia Region. Production methods are implemented that encourage local adaptation to the various habitats within the region while minimizing negative effects on natural fish populations. One goal of the Mid-Columbia Habitat Program is to protect and restore critical habitats for salmon and steelhead within the Mid-Columbia Region (Bugert et al. 1997). The Mid-

Columbia Hatchery Program (BAMP 1998) on which the summer chinook release programs are based will therefore work in concert with that program. The main fresh-water habitat problem presently facing this ESU is presence of hydropower dams in the mainstem Columbia River, which have probably reduced returns of chinook salmon (Chapman et al. 1994). Measures taken by the Mid-Columbia PUDs to improve natural production of anadromous fish in the region will compensate for mortality in project and reservoir passage. Two strategies will be used: (1) habitat protection and restoration, and (2) hatchery production of affected species in the mainstem mid-Columbia River and in the four major tributaries (BAMP 1998).

Habitat protection efforts, combined with production from the summer chinook hatchery programs, are expected to benefit natural summer chinook production over the short-term and long- term. Improvements in dam passage survival rates, and improvements in smolt to adult survival rates afforded by the summer chinook programs will be used to boost the upper river adult population to a level approaching 18,000 fish at Priest Rapids Dam and approaching 8,000 at Rocky Reach Dam (BAMP 1998).

WDFW is a cooperating agency involved in regional fish and wildlife planning and technical assistance effort through the Upper Columbia Salmon Recovery Board (UCSRB). The mission of the UCSRB is to restore viable and sustainable populations of salmon, steelhead, and other at-risk species through the collaborative, economically sensitive efforts, combined resources, and wise resource management of the Upper Columbia Region. Along with Chelan, Douglas, and Okanogan counties, the Yakama Nation, and Colville Confederated Tribe, local, state, and federal partners, agency staff will be working closely in partnership with existing planning efforts in the region including Wenatchee Watershed Planning, Entiat Watershed Planning, Lead Entities, Regional Fisheries Enhancement Group, and Salmon Recovery Planning.

Six fish and wildlife plans (also known as "sub-basin plans") have been developed for the following "sub-basins" (commonly known as watersheds): Wenatchee, Entiat, Lake Chelan, Methow, Okanogan, and the mainstem Columbia River from Rock Island dam to the Canadian border. Sub-basin plans and have been submitted to the Northwest Power Planning Council in May 2004. These sub-basin plans will identify and provide the basis for prioritizing project proposals to be submitted to the Northwest Power Planning Council in future funding cycles and will be used, potentially, for salmon recovery planning in North Central Washington.

WDFW helps ensures that actions taken to protect and restore salmonid habitat in the region are based on sound scientific principles thru technical assistance of Regional staff. In addition to habitat, WDFW is involved with the Yakama Nation and Colville Confederated Tribes in helping develop recovery goals, and providing coordination and representation for all 4 H’s (Harvest, Hydro, Hatcheries and Habitat). At the watershed scale, technical tools such as Limiting Factors Analysis (LFA), Ecosystem Diagnosis and Treatment (EDT) and SSHIAP (Salmon and Steelhead Inventory and Assessment Program) will used to identify factors that currently impact salmon and the priority actions needed in the watershed.

3.5 Ecological interactions.

Salmonid and non-salmonid fishes or other species that could:

(1) negatively impact program;
Summer chinook smolts are released in the spring as either yearlings or sub-yearlings. Competition for food may play a role in the mortality of liberated summer chinook. SIWG (1984) indicated that there is a high risk that competition between hatchery-origin chinook, and coho, steelhead and other chinook stocks, will have a negative impact on the productivity of the hatchery fish. Predation in freshwater areas also may limit the productivity of the summer chinook releases. In particular, predation by northern pike minnow poses a high risk of significant negative impact on productivity

of enhanced chinook (SIWG 1984). Predation risks to hatchery chinook juveniles posed by coho, steelhead, and other chinook stocks are unknown (SIWG 1984). Hatchery-reared salmon and steelhead released into spawning and rearing areas of natural species may fail to emigrate (residualize), and may negatively interact with natural fish. Steelhead residualism has been found to vary greatly, but is thought to average between 5% and 10% of the number of fish released (USFWS 1994). Because of their larger size, the predation risk posed by the above species is lower to yearling smolts released from the hatcheries (Rieman et al. 1991).

(2) be negatively impacted by program;
SIWG (1984) reported that there is a high risk that enhanced chinook salmon populations would negatively affect the productivity of wild chum and sockeye in freshwater and during early marine residence through predation. The risk of negative effects to wild fish posed by hatchery chinook through competition is low or unknown in freshwater and marine areas (SIWG 1984). Large concentrations of migrating hatchery fish may attract predators (birds, fish, and seals) and consequently contribute indirectly to predation of listed wild fish (Steward and Bjornn 1990). The presence of large numbers of hatchery fish may also alter wild salmonid behavioral patterns, potentially influencing their vulnerability and susceptibility to predation.

(3) positively impact program;
Increased numbers of chinook and other salmonid species that escape to spawn in upper Columbia River tributaries may contribute nutrients to the system upon dying that would benefit summer chinook productivity.

(4) be positively impacted by program.
Summer chinook juveniles released through the WDFW programs may benefit co-occurring salmonid populations. A mass of hatchery fish migrating through an area may overwhelm established predator populations, providing a beneficial, protective effect to co-occurring wild fish. Increased numbers of hatchery-origin summer chinook that are allowed to spawn naturally may contribute nutrients to the system upon dying that would benefit the productivity of other salmonid species.

Section 4. Water Source

4.1 Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile and natural limitations to production attributable to the water source.

Eastbank Hatchery has four wells that supply 53 cfs, varying in temperature from a low of 46oF in May to a high of 57oF in December. Water temperatures range from 7.8°C in May to 13.9C in December. No rearing limitations within water supply. Water rights have been or will be obtained for each of these propagation and acclimation facilities. The quality of water used at Eastbank Hatchery is high, and adequate to ensure the health of salmonids propagated. Fish reared at this hatchery are transferred to acclimation ponds (Similkameen, Carlton) for rearing to smolt size and release. The rearing/acclimation ponds are supplied with river water at each site (Similkameen – 21 cfs, and Carlton - 15 cfs) and there are no differences between the water used for these latter portions of the summer chinook programs and water used by the naturally spawned populations. Transfer of summer Chinook to the various acclimation ponds need to occur only after river temperatures in mid-fall (October) will have declined to safe levels.

Carlton Pond: Carlton – This facility has a 15 cfs pumped from the Methow River.

Similkameen Pond: This facility has a large covered rearing pond used for rearing summer chinook salmon. The water supply (21 cfs) is pumped from the Similkameen River. The facility has a back-up aeration system for use when the water supply is shut off due to ice formation or from toxic spills.

Bonaparte Pond: Up to 25 cfs of Okanogan River surface water. Water temperature should be from the mid to high 30's in December, low to mid 30's in January and February, mid 30's to mid 40's in March, mid 40's to mid 50's in April.

4.2 Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

Adverse impacts on listed fish due to the operation of hatchery facilities for the propagation of unlisted species may occur because of river water intake placement, or design, or operation including blocked migration, de-watering river reaches or reduced stream flow, and entrainment from unscreened or improperly screened intakes. Effluent from hatchery facilities may decrease quality through changes in water temperature, pH, suspended solids, ammonia, organic nitrogen, total phosphorus, and chemical oxygen demand in the receiving streams mixing zone (Kendra 1991). Water withdrawal for use in hatcheries is monitored through the Washington State Department of Ecology and the Washington State chapter 90.03 Revised Code of Washington (RCW) water code. None of the hatchery facilities employed to carry out the proposed artificial propagation programs de-water river reaches used by listed fish for migration, spawning, or rearing.

In the mainstem Columbia River, Eastbank Hatchery does not use any surface water, so no intake structures are associated with these operations, and no intake screening that may lead to listed juvenile fish injury through entrainment exists. Juvenile fish screening for the water intake systems at Turtle Rock, Wells Hatchery and Priest Rapids Hatchery are not in compliance with NMFS screening criteria (NMFS 1996). The facilities were built prior to the establishment of NMFS criteria. Douglas PUD is committed to be in compliance by November 2005 (Shane Bickford, pers. com., October 1, 2003). Routine intake screen inspections and upgrading to current screening criteria when existing screens fail are conditions which will be included in permit 1347. Without these conditions, water intakes for the hatchery may adversely affect listed spring chinook and steelhead juveniles through entrainment. Application of the conditions to the operation of these hatcheries through this Opinion will help ensure that the effects of the hatchery intakes on listed fish are adequately minimized.

The applicants propose to operate and monitor their programs in compliance with applicable NPDES permit effluent discharge limitations. Each permit contains limits concerning discharge, monitoring and reporting requirements, and other provisions to ensure that the discharge does not hurt water quality or people's health. In essence, the permit translates general requirements of the Clean Water Act into specific provisions tailored to the specific hatchery facility operations and the discharge of pollutants. Although the actual level of impact of hatchery effluent discharge on listed fish survival is unknown, it is presumed to be small and localized at outfall areas, as effluent is diluted downstream. This facility operates under the "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System (NPDES) general permit which conducts effluent monitoring and reporting and operates within the limitations established in its permit administered by the Washington Department of Ecology (DOE). WAG 13-5011. Monthly and annual reports on water quality sampling, use of chemicals at this facility, compliance records are available from DOE.

Discharges from the cleaning treatment system are monitored as follows: *Total Suspended Solids (TSS)*C1 to 2 times per month on composite effluent, maximum effluent and influent samples. *Settleable Solids (SS)*C1 to 2 times per week on effluent and influent samples. *In-hatchery Water Temperature* - daily maximum and minimum readings.

Section 5. Facilities

5.1 Broodstock collection facilities (or methods).

Ponds (number)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Available Flow (gpm)
1	Concrete Pond- Eastbank Hatchery	2120	58	9.75	3.75	500-550

Early-arriving summer/fall Chinook broodstock for the Okanogan and Methow sub-basins are collected each year from the run at large reaching Wells Dam. Trapping in the Wells Dam east ladder begins on July 1st and ends on August 31st. Trapping occurs 3 days/week, up to 16 hours per day with fish removed from the traps daily.

Fish traps at Wells Dam are located in the ladders on both the east and west sides of the dam
The left bank trap is comprised of a denil ladder leading into a holding tank at the mid section of the ladder system. The area of the trap where fish are held measures 10.5' long x 8' wide, with depth varying between 6'-7', depending on river flow. From this holding tank fish are allowed to exit at a reduced rate to be identified for retention for the program or shunted back into the ladder to continue up-stream. Summer chinook retained as broodstock will be held and spawned at Eastbank Hatchery

5.2 Fish transportation equipment (description of pen, tank, truck, or container used).

Equip. Type	Capacity (gallons)	Supp. Oxygen (y/n)	Temp. Control (y/n)	Norm. Transit Time (minutes)	Chemical(s) Used	Dosage (ppm)
Tanker Truck (Juvenile/Smolt Hauling-Carlton Satellite)	2500	Y	N	90	MS 220 and NaCl	5-1.0% (NaCl)

5.3 Broodstock holding and spawning facilities.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Available Flow (gpm)
1	Concrete Pond- Eastbank Hatchery	2120	58	9.75	3.75	500-550

5.4 Incubation facilities.

Incubator Type	Units (number)	Flow (gpm)	Volume (cu.ft.)	Loading-Eyeing (eggs/unit)	Loading-Hatching (eggs/unit)
Heath Stacked Tray (104 half stack units with 7 trays per 1/2 Stack	104	4.5	-	6000	8000

The main hatchery, Eastbank, is equipped with a chilled water supply.

5.5 Rearing facilities.

Summer chinook fry are reared to fingerling size at Eastbank hatchery. The fish reared at Wells are released as yearlings and sub-yearlings. The fish reared at Eastbank (see below for rearing structures used) are transferred as fingerlings in the fall for over-wintering at Similkameen Pond, and in the late winter or early spring to Carlton Pond for continued rearing to yearling smolt size and spring release.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Flow (gpm)	Max. Flow Index	Max. Density Index
2	Concrete Standard Raceways-Eastbank Hatchery	3760	100	10	3.76	900	-	0.125
3	Super-Racerways	22200	180	20	6.2	3500	-	0.125

5.6 Acclimation/release facilities.

The Carlton Pond facility consists of a large hypalon-lined rearing pond located on the Methow River near Twisp, Washington. This facility is used to acclimate Methow summer chinook. Water (15 cfs) is pumped from the Methow River.

Similkameen Pond is a single, trapezoid pond with concrete end structures, sloped sides, and hypalon floors. Useable pond volume is 77,000 cubic feet. The pond is supplied with 21 cfs of water from the Similkameen River and a small amount of well water. The pond is located on the right bank of the Similkameen River at river kilometer 5, near the town of Oroville.

Bonaparte Pond is an open-air pond, is 128’x102’x12’, and has 65,300 cubic feet of useable rearing volume at an operating depth of 5 feet. The pond’s water is supplied by five pumps, each delivering five cfs from the Okanogan River. The pond will therefore have a turnover rate of about 1.4/hour. The pond is located on the left bank of the Okanogan River, immediately downstream from the town of Tonasket.

5.7 Describe operational difficulties or disasters that led to significant fish mortality.

Methow River/Carlton Pond – None known.

Okanogan River/Similkameen Pond – located on the Similkameen River (WRIA 49-0325) at rm 3.1 (rkm 5), near the town of Oroville. Similkameen Pond program has had difficulties meeting its goals due to a variety of disease and water quality problems. The program has faced losses from cold-water disease, BKD, and Ich. Water quality problems have included high water temperatures, pollution, and heavy loads of fine sediments (S. Bickford pers comm. 2003). In October 2002, a parasitic infestation (*Ichthyophthirius multifilis),* killed an estimated 320,000 young salmon at the Similkameen rearing pond. The “ich parasite” was believed to have come from adult salmon that were spawning in the Similkameen River, which is the water supply for the rearing pond near Oroville in Okanogan County. At the same time, the river flow was low — roughly 336 cubic feet per second, about half the normal flow for the last 73 years. With the low river flow, the water was warmer than usual and ideal for reproduction of the parasite. An aeration system is installed to supply oxygen to the pond during periods when water flow is shut off due to ice formation or toxic spills in the river.

5.8 Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.

Summer chinook are not listed.

Potential adverse impacts identified with the physical operation of hatchery facilities include impacts from water withdrawal, release of hatchery effluent and facilities failure (NMFS 1999a). Hatchery effluent may transport pathogens (disease) out of the hatchery and infect natural-origin fish. Aside from the potential impacts on water flow and quality, operational failures due to power/water loss, flooding, freezing, vandalism, predation and disease may result in catastrophic losses to rearing adults and juveniles.

Flow reductions, flooding and poor fish culture practices may all cause hatchery facility failure or the catastrophic loss of listed fish under propagation. To protect fish, all efforts should be made to ensure that the survival of fish held for broodstock at the hatchery facility be maximized. The applicants propose a variety of measures to address risks associated with operational failures, including:

- Protection of fish from vandalism and predation is provided by fencing, locks, and security lights at all hatchery facilities;
- Rapid response in the event of power and water loss or freezing is provided by a combination of staffing and automated alarm paging systems;
- Equipping hatchery facilities to ensure reliable power to provide water to rearing fish during power outages.

Eastbank Hatchery: UCR summer/fall Chinook are not ESA-listed. Take of UCR steelhead and UCR spring Chinook associated with rearing summer Chinook occurs associated with the broodstock collection at Wells Dam, Dryden Dam and Tumwater Dam. These activities are cover by Section 10 direct take permits.

Carlton Pond: The pond does not rear ESA listed fish. Water supplied to the pond is screened to NMFS flow and screen standards to avoid entrainment of UCR steelhead. The pond is located above the flood zone. Disease prevention methods are employed for health of program fish and to minimize the transmission of diseased fish or disease agents to the Methow River. The pond receives regular vacuuming and personnel routinely remove mortalities. Fish inspections by certified fish pathologists are undertaken on a regular basis.

Similkameen Pond: The pond does not rear ESA-listed fish. Water supplied to the pond is screened to NMFS flow and screen standards to avoid entrainment of UCR steelhead. The pond is located above the flood zone. Disease prevention methods are employed for health of program fish and to minimize the transmission of diseased fish or disease agents to the Okanogan River. The pond receives regular vacuuming and personnel routinely remove mortalities. Fish inspections by certified fish pathologists are undertaken on a regular basis.

Bonaparte Pond: The pond will not rear ESA-listed fish. Water supplied to the pond is screened to NMFS standards with 3/32” wedge wire to avoid entrainment of UCR steelhead. The pond is located above the flood zone. Disease prevention methods will be employed for health of program fish and to minimize the transmission of diseased fish or disease agents to the Okanogan River. The pond will receive regular vacuuming and personnel will routinely remove mortalities. Fish inspections by certified fish pathologists will be undertaken on a regular basis.

Section 6. Broodstock Origin and Identity

6.1 Source.

Since the initial operation of the spawning channel in 1967, broodstock collected for Wells Hatchery has come from fish diverted out of fish ladders while passing Wells Dam or from volunteers that enter the trap at the upper end of the hatchery discharge (Chapman et al. 1994). With the exception of undetected strays from other areas that may have contributed to the Wells broodstock collections, and the potential incorporation in some years (1967-86) of fall-run chinook, all broodstock for the Wells Hatchery program came from local Columbia River summer chinook stock (Chapman et al. 1994). Since founding the Wells summer chinook program from trapped Methow/Okanogan natural fish, there has been a transition to the use of mixed natural and hatchery-origin volunteer broodstocks at Wells Hatchery for the Wells and Rocky Reach mitigation programs.

As soon as possible, the composite broodstock from Wells Dam Trap and, at times, Wells Hatchery will be replaced with broodstock collected specifically from the Okanogan River. Means to collect local broodstocks on the Methow and Okanogan river will be studied as returning salmon from the Carlton (Methow River), Similkameen (Okanogan River), and Dryden (Wenatchee River) programs volunteer into Wells FH, yet they are identified by CWT and can be placed into their program of origin if desired (Eltrich et al. 1995; BAMP 1998). Upon development of broodstock collection capabilities for the Okanogan River, broodstock will not be collected at Wells Dam. Over time, this will allow the population of the Okanogan River to specifically adapt to the habitat conditions of the Okanogan River and mainstem Columbia River without any potentially confounding effects of Chinook originating from the Methow sub-basin.

The Similkameen Pond program has been operated consistently with the planned objective of managing the Okanogan and Methow summer/fall Chinook as a single population. Actions need to be undertaken in the Okanogan sub-basin to improve the consistency of the existing program include:

1. Develop a local Okanogan broodstock, separate from the Methow population.
2. Propagate the entire summer/fall Chinook run, including fish arriving in September, October, and November.
3. Propagate and evaluate the benefits and costs of releasing the natural sub-yearling type juvenile in addition to the yearling smolts.
4. Continue to disperse acclimated hatchery releases throughout the full range of historical habitat.
5. Develop harvest strategies that manage for the proportion of hatchery-origin fish in the spawning population to optimize the population's viability.

6.2.1 History.

Broodstock Source	Origin	Year(s) Used	
		Begin	End
Wells Hatchery Summer Chinook (Admixture of Natural and Hatchery)	N/H	1989	Present
Methow/Okanogan Summer Chinook	N/H	1996	Present

Summer chinook broodstock collected for the hatchery programs are the descendants of stock manipulations during the Grand Coulee Fish Maintenance Program and mainstem dam mitigation (Myers et al. 1998). These activities tended to homogenize extant summer chinook populations, and likely resulted in incorporation of fall-run fish into summer chinook runs under propagation. The percentage of non-indigenous stocks incorporated into the hatchery programs has been low (about 3 % of the over 200 million ocean-type chinook propagated since 1941), and does not appear to have had a significant impact on the genetic integrity of the ESU (Chapman et al. 1994; Myers et al. 1998).

Methow and Okanogan basin origin summer chinook were the major populations intercepted at Wells Dam, and supplying broodstock for the program. Propagation of summer/fall Chinook in the Columbia Cascade Province started with operation of the Wells spawning channel in 1967. Initially, the entire run was propagated. Then in 1987, broodstock collection was terminated after August 28th to avoid including stray fall Chinook from downriver programs. All broodstock came from local Columbia River summer/fall Chinook stock with few exceptions. Broodstock was diverted from ladders at Wells Dam or from volunteers that entered the trap at the hatchery discharge. Only low numbers, about 3%, of non-indigenous stocks have been incorporated into the broodstock over the years. Methow and Okanogan sub-basins were the major populations intercepted at Wells Dam and supplied the broodstock for the programs (Brown 1999). Since 1987, early-arriving summer/fall Chinook broodstock for the Rocky Reach/Turtle Rock program and the Similkameen program have also been obtained from the trap at Wells Dam and consequently have a similar history (Brown 1999). Prior to 1987, summer/fall chinook were trapped from the west fish ladder at Wells Dam and were diverted into Wells Hatchery. Trapping took place from mid-July through early November (S. Bickford, pers comm. 2003).

Chinook salmon broodstock for Wells FH has routinely been collected primarily from volunteers to the hatchery, and secondarily from the fishways at Wells Dam. Trap operation on the west fishway posed some difficulties however, for maintenance of stock integrity for the hatchery. Most (80%) of the summer chinook adults passing Wells Dam enter the east fishway, making broodstock collection on the west fishway time consuming. Trap operations often had to continue well into late September to collect adequate broodstock. This caused problems with potential collection and spawning of fall chinook salmon (notably Priest Rapids stock) in the Wells FH production. The presence of Priest Rapids hatchery fish in the Wells FH broodstock was verified through coded-wire tag recoveries. In 1991, a trap was built on the east fishway at Wells Dam. Summer chinook salmon are collected for broodstock at this site (primarily for the Similkameen and Carlton acclimation ponds operated by Eastbank FH, and secondarily for Wells FH). Broodstock collection has become more expedient as a result. Trap operations terminate on 28 August, which virtually eliminated all known fall chinook salmon from the Wells broodstock, as determined by subsequent coded-wire tag analyses (LaVoy 1992, 1993). In 1991 and 1992, fish were trapped on the east and west fishways; since then, only the east fishway trap was used. Prior to 1991, fish were collected on the west fishway only. Sufficient escapement past Wells Dam is required for the Methow, Similkameen, and Okanogan Rivers. These streams are managed on a natural stock basis (NPPC 1991). The long-term escapement goals of the Integrated System Plan is to achieve Maximum Sustainable Yield; desired escapement past Wells Dam is 1,503 summer chinook for the Methow Sub-basin, and 6,043 summer chinook for the Okanogan/ Similkameen Sub-basin. Broodstock collection at Wells Dam is managed to balance the needs of hatcheries and natural escapement goals.

6.2.2 Annual size.

The program collects 556 fish; achieves a 1 to 1 female to male ratio; assumes a 90% pre-spawn survival rate; assumes 5,000 eggs/female; assumes an egg to release survival rate of 78%; and achieves a program objective of 976,000 yearling smolts (Peterson and Truscott 2001). Since inception of Wells FH in 1967, less than 25% of the summer chinook salmon run (adults and jacks) to Wells Dam were collected for broodstock, both as volunteers and on the west fishway. In some years however, collections included egg-take needs for Entiat and Winthrop National Fish Hatcheries. Most fish used for production are from voluntary returns to the hatchery. From 1985 to 1993, 77% of the summer chinook used at Wells FH were volunteers, although eggtake goals were not met in 1987, 1992, and 1993. LaVoy (1993) estimated that 9% of the adult summer chinook migrating through Wells Dam in 1992 were intercepted for broodstock. The production objectives for Wells FH are to release 484,000 sub-yearlings in June at 20 fish per pound (fpp), and 320,000 yearlings in April at 10 fpp. To meet these goals, an eggtake of 1 million is required. The production objectives for Eastbank FH include 400,000 yearlings for release from Carlton in April and May at 10 fpp, and 576,000 yearlings for release from Similkameen in April at 10 fpp. To meet these objectives, an eggtake of 1.2 million is required. These values are based upon 85% sub-yearling and 80%

yearling egg-to-smolt survival rates. The average pre-spawning mortality at Wells FH is 12%, average male:female ratio is 1:1, and average fecundity is 4,900 eggs/female. If one million eggs are needed for Wells FH production, 457 adults need to be collected from Wells Dam and Wells FH ladder combined. For Eastbank FH production, 594 adults need to be taken from Wells Dam. If 77% of the summers required for Wells FH can be obtained through volunteers, 106 adults (23% of 457) need to be trapped at Wells Dam for complete production. A total of 700 adults therefore, need to be trapped for Eastbank and Wells FH (106 plus 594). Average summer chinook run size to Wells Dam from 1983 to 1993 is 3,477 adults. Conceivably, 20% (700 out of 3,477) of the run would be required for hatchery production. The objective of maximum escapement upstream of Wells Dam must be balanced with the preponderance of volunteers relative to trapped fish. Consecutive record low numbers of summer chinook salmon passed Wells Dam in 1991 (1,776 adults and 270 jacks) and 1992 (1,333 adults and 631 jacks), despite relatively strong returns of volunteers to Wells FH. Trapping was curtailed at the dam both years to increase upstream escapement, yet collections of volunteers to the hatchery continued. The result of this action was to take progeny of Wells FH volunteers for production at Eastbank FH.

No more than 20% of the early-arriving adult run is collected based on counts at Rocky Reach Dam. If cumulative adult counts at Rocky Reach Dam are less than 40% of the 10-year average, then broodstock collection ceases until the 40% escapement level has been reached. All collection occurs in the east ladder trap with the west ladder only used if difficulties are encounter in the east ladder. All Chinook collected at Wells Dam are differentially marked to distinguish them from those collected at the Wells Hatchery's volunteer channel (Brown, 2001). Equal numbers of males and females are collected. Jack Chinook are collected in proportion to the run-at-large. The broodstock collection protocols are reviewed annually (Brown, 2001). A primary consideration in broodstock collection is achieving a minimum natural escapement of 2,000 adults and jacks past Wells Dam, with an emphasis on meeting a 3,500 fish escapement level. In low run years, hatchery programs are reduced or deferred to increase escapement. In low run years, the order of elimination in hatchery programs is 1) Wells sub-yearlings, 2) Wells yearlings, 3) the Carlton (Methow) and Similkameen (Okanogan) programs. In low run years, escapement to Wells Hatchery can be used in the Okanogan program (Brown, 2001).

6.2.3 Past and proposed level of natural fish in the broodstock.

Summer chinook salmon used as broodstock are the progeny of natural or hatchery-origin fish originating from the Methow and Okanogan river watersheds collected in July and August at Wells Dam and at WDFW's Wells Hatchery trap on the mainstem Columbia River and what else traps (Dryden Dam etc) . Since 1996, adult originating from the "ME-OK" system have been identified from adults originating from the Methow and Okanogan systems from those components of the Wenatchee River system and Wells Hatchery releases. Methow and Okanogan Sub-basin summer chinook are managed for natural production, with an informal escapement goal of 3,500 fish past Wells Dam. This natural run is a mixture of strays from Wells Dam Hatchery, descendents of remnant native summer chinook, and stocks transferred during the Grand Coulee Fish Maintenance Project (GCFMP). They are genetically homogenous with other upper and mid-Columbia River summer and fall chinook populations, likely because of post-GCFMP and current hatchery practices (Chapman et al. 1994a). These programs will propagate local summer/fall Chinook to supplement natural-origin populations in the Methow, Okanogan, Similkameen, and Columbia rivers. The programs are needed to assist populations depressed by degraded habitat and passage through nine mainstem dams. The program will expand the distribution of the spawning populations in their historical habitat and propagate all components of the population to restore the complete genetic profile of the ESU. All Chinook will be adipose fin clipped and 100% coded wire tagged to distinguish them from natural-origin fish. Currently, adult fish at Wells Dam are being tagged as part of the Colville Confederated Tribes' study, in cooperation with the Washington Department of Fish and Wildlife (WDFW) and the Columbia River Inter-Tribal Fish Commission. Telemetry tags are being used to identify migration routes through the Upper Columbia and Okanogan rivers to support broodstock collection for future hatchery production, and to evaluate possible future selective fishing opportunities. Information will also be used to assist in the design of the Colville Confederated Tribes new Chief Joseph Dam Salmon Hatchery.

Varying numbers of natural summer chinook salmon volunteer into Wells FH on an annual basis and are incorporated into the broodstock. Collection of broodstock at Wells Dam must initially be based on counts of early-arriving summer/fall Chinook at Rocky Reach Dam. However since 1990, the Wells Dam count has varied significantly, from 44% to 80%, of the Rocky Reach Dam count. Fishery managers collecting broodstock at Wells Dam will need to be cognizant of the cumulative counts at Rocky Reach Dam to follow collection protocols. All hatchery-origin summer/fall Chinook escaping to and above Wells Dam will be adipose fin clipped, whereas natural-origin fish will be unmarked. Natural-origin Chinook must be integrated into the hatchery broodstock to ensure that the hatchery fish are not allowed to genetically diverge from the naturally spawning fish. Integration of natural-origin fish is also important to prevent long-term domestication of the broodstock. From 1998-2002 the proportion of hatchery-origin fish spawning in the Similkameen River has averaged 57% (range 41-70%), while in the Okanogan River, hatchery-origin fish have averaged 51% of the natural spawners (range 33-61%). In both rivers, the proportion of hatchery-origin spawners increases with increasing escapement. This information is important is establishing protocols for broodstock collection. In collecting broodstock, up to 100% of broodstock should be unmarked, natural-origin fish. However, not more than 20% of the natural-origin run should be collected for broodstock (Table 7). Hatchery fish comprised an average 39% of the broodstock total from 1994-1996 and has increased to an average of 63.8% between 1997 and 2001.

6.2.4 Genetic or ecological differences.

For early-arriving summer Chinook, there are no known genotypic, phenotypic, or behavior differences between the hatchery stocks and natural stocks in the target area (Brown 1999). This observation is likely due to the protocols for past broodstock collection that collect fish from the early-arriving summer/fall Chinook run and integrate natural-origin fish into the hatchery program for both the Methow and Okanogan systems. Also, hatchery-origin fish make up a large proportion of the naturally spawning population (Bartlett, pers. com. June 2002). These relatively high proportions of hatchery-origin fish over time have likely accomplished a homogenized, single population of early-arriving summer/fall Chinook and releases from both Methow and Okanogan (Similkameen Pond) programs have been operated consistently with the planned objective of managing the Okanogan and Methow summer/fall Chinook as a single population.

Future plans by WDFW and the Colville Tribe include developing stocks local to both the Methow and Okanogan systems. The Colville Tribe intends to restore the natural variability of the province’s Chinook and more fully utilize the historical Chinook habitat of the lower Okanogan River and Columbia River by initiating a propagation program for the later-arriving Chinook (pers. comm. J. Peone 2005). Since the late 1980’s, later-arriving summer/fall Chinook had purposefully not been included in the summer/fall Chinook hatchery broodstock and given the high mortality rates for Chinook above nine dams, the natural-origin, later-arriving Chinook have declined to lower levels than the earlier-arriving Chinook. Developing local stocks will be dependent upon development of broodstock collection capabilities for the Okanogan River and broodstock in time would not be collected at Wells Dam. If separate identification proves successful, then the Okanogan River summer/fall Chinook population would be managed as a separate population.

6.2.5 Reasons for choosing.

The summer/fall Chinook migrating past Wells Dam represent a mixture of the indigenous Methow and Okanogan populations which are the target of the mitigation programs. Fish past Wells Dam are being researched to determine make-up of summer chinook in the Methow system and summer and late summer components to the Okanogan system.

6.3 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.

Methow/Okanogan, Wells Hatchery, and Turtle Rock Programs (Broodstock Collection at Wells Dam and Wells Hatchery). Summer chinook salmon broodstock are collected each year from the run at large reaching Wells Dam, located at Rkm 861.0 on the Columbia River during the months of July and August. Broodstock for the Similkameen and Carlton programs are currently trapped in the fish ladders circumventing Wells Dam. Fish volunteering into Wells FH are used primarily for the Wells and Turtle Rock programs. To prevent inclusion of fall chinook population into the summer chinook gene pool, broodstock collection at both capture sites is curtailed on August 28. Ladder-trapped fish are transported to Eastbank FH where they are held until maturity and spawned. Gametes from fish with CWTs are held separately until the origin of the fish is determined. Only summer chinook salmon are used in these programs.

The ladder traps are operated from early May through November to collect spring chinook, summer chinook, and fall chinook, and steelhead broodstock for use in stock recovery and fisheries enhancement programs. Active trapping occurs 16 hours per day on a consistent schedule, and fish are removed from the traps at least daily when the traps are operational. Summer chinook broodstock are trapped each year in the east side trap, and the west side trap is only used when difficulties are encountered in securing fish from the east side trap. Fish trapped the west side ladder ascend a 12ft Denil fish ladder into a 12ft x 12ft x 8ft deep holding tank. Captured fish can then be directed from the holding tank over a false weir leading to a V shaped chute, which funnels the fish into an underground pipe leading to a 12 ft x 100 ft pond, where broodstock are held for spawning. Movement of fish in this manner is automatic, and no handling with nets which could damage the fish is involved. At the Wells east ladder trap, the fish ladder closes above a large holding area from which fish ascending a denil fishway and false weir are diverted via a chute directly into a truck-mounted anesthetic tank. There is no netting or other handling of fish trapped at the east ladder prior to being anesthetized, after which they can be tagged, recovered, and/or placed in transport trucks. The risk of injury to fish is minimized through application of these measures.

Measures to reduce sources of bias that could lead to a non-representative sample of the desired Methow/Okanogan basin brood stock sources include trapping all fish randomly from the run at large and throughout the duration of passage to ensure proportional representation of the age and size structure of the returning population. Additional measures employed to reduce the risk of adverse genetic effects to the population is a collection date beginning no earlier than June 28 and ending no later than August 28 to exclude spring-run and fall-run chinook from collections. Hatchery summer chinook volunteering to the hatchery trap can be separated by origin through CWT analysis. This process will allow differentiation between Carlton, Similkameen, and Wells hatchery-origin fish (as well as out-of-basin strays) prior to spawning and maintenance of separate local broodstocks for each production area as necessary.

Section 7. Broodstock Collection

7.1 Life-history stage to be collected (adults, eggs, or juveniles).

Adult summer chinook salmon are to be collected at Wells Dam for use as broodstock. The broodstock collection objective is to remove equal numbers of males and females.

7.2 Collection or sampling design

Selectively retain 556 summer chinook between 01 July and 31 August for transfer to and holding/spawning at Eastbank FH. The trap will operate 3 days/week, up to 16-hours a day with the ladder open to passage at night between 01 July - 31 Aug. 2005. Collection will maintain, at a minimum, 50% wild origin fish in the broodstock. The 3-year old component, will be limited to 10% of the broodstock total.

Draft adult broodstock collection protocols such as those outlined below (2003-04) are keyed on target numbers at various collection sites operated by WDFW that provide broodstock for Mid-Columbia PUD mitigation program facilities. Adult broodstock collection protocols are to be considered an interim and dynamic hatchery broodstock collection plan, which may be altered following joint fishery party (JFP) discussions. As such, there may be significant in-season changes in broodstock numbers, locations, or collection times, brought about through continuing co-manager consultation and in-season monitoring of the anadromous fish runs to the Columbia River above Priest Rapids Dam.

Beginning in 1997, the adult supplementation program for the Methow/Okanogan Basins has incorporated an increasing proportion of hatchery origin adults into the broodstock. Hatchery fish comprised an average 39% of the broodstock total from 1994-1996 and has increased to an average of 63.8% between 1997 and 2001. In addition to the increasing hatchery component observed in the broodstock collection since 1997, an increase in the proportion of “strays” has also been evident. Strays provided an average 0.6% of the total broodstock collected between 1994 and 1996. During the 1997-2001 period, the proportion of strays in the total broodstock collected, ranged from 0.8% to 21%. A consistent and increasing reliance on hatchery origin fish, with potentially high stray component, to support an adult supplementation program may eventually have negative consequences to the program. Consistent with broodstock collection in 2002, WDFW proposes to reduce both the hatchery and stray proportion in the broodstock collection by reducing the hatchery contribution during 2003 to no more than 50% of the broodstock collection. Fish will continue to be collected throughout the summer chinook return past Wells Dam through 28 August 2003. The origin in the collection will be consistent with a minimum 1:1 ratio of hatchery and wild origin fish. The 2002 broodstock collection was achieved utilizing just 8 of 27 available trapping days; therefore, a full broodstock collection is likely in 2003.

Collection in the manner proposed for 2003 will result in additional summer chinook being handled, consistent with that observed in 2002. While additional fish will be handled, the fish retained for broodstock will be limited to 556 adult summer chinook, consistent with the draft Biological Opinion for the artificial propagation in the Upper Columbia River Basin of non-listed anadromous fish stocks. The trap will operate 3 days/week, 16-hours a day with the ladder open to passage at night between 7 July - 28 Aug. 2003. Collection will maintain, at a minimum, 50% wild origin fish in the broodstock. The 3-year old component will be limited to 10% of the broodstock total.

Methow/Okanogan summer chinook program and assumptions:

Program	976,000 yearling smolts
Propagation survival	78% fertilization to release
Fecundity	5,000 eggs per female

Female to male ratio	1 to 1
Pre-spawn survival	90%
Broodstock required	556

Trap 556-mixed origin (minimum 1:1 ratio of hatchery and wild), summer chinook at Wells Dam east ladder. Collection will be proportional to return timing between 7 July and 28 August. The 3-year old component will be limited to 10% of the broodstock collection to minimize the potential of reduced production as a result of a strong 3-year-old age class, as was the case in 2001.

Early-arriving summer/fall Chinook broodstock for the Okanogan and Methow sub-basins are collected each year from the run at large reaching Wells Dam. Fish traps at Wells Dam are located in the ladders on both the east and west sides of the dam. Fish reaching the top of the west side ladder ascend a 12' *Denil* fish ladder into a 12' x 12' x 8' deep holding tank. Captured fish can then be directed from the holding tank over a false weir leading to a "V" shaped chute, which funnels the fish into an underground pipe leading to a 12' x 100' pond, where broodstock are held for spawning. Movement of fish in this manner is automatic, and no handling with nets, which could damage the fish, is involved. Trapping in the Wells Dam east ladder begins in July and ends in October.

If cumulative adult counts at Rocky Reach Dam are less than 40% of the 10-year average, then broodstock collection ceases unit the 40% escapement level has been reached. All collection occurs in the east bank ladder trap at Wells Dam, with the west ladder only used if difficulties are encounter in the east bank ladder. All Chinook collected at Wells Dam are differentially marked to distinguish them from those collected at Wells Hatchery (Brown, 2001). Equal numbers of males and females are collected. Jack Chinook are collected in proportion to the run-at-large. The broodstock collection protocols are reviewed annually (Brown, 2001). A primary consideration in collection of early-arriving summer/fall Chinook is achieving a minimum natural escapement of 2,000 adults and jacks past Wells Dam, with an emphasis on meeting a 3,500 fish escapement level. In low run years, hatchery programs are reduced or deferred to increase escapement. The order of elimination in hatchery programs is 1) Wells sub-yearlings, 2) Wells yearlings, 3) the Carlton (Methow) and Similkameen (Okanogan) programs. In low run years, escapement to Wells Hatchery can be used in the Okanogan program (Brown, 2001). The broodstock for the new, later-arriving summer/fall Chinook program will be collected using live-capture gear in September through mid-November. The dates and locations of this trapping will depend on results from gear research. As a contingency, collection will occur at Wells Dam's east ladder trap from August 29th through mid-November. Fish will be taken equally from throughout the run, with an equal collection of males and females. No more than 20% of the adult run will be collected based on counts at Rocky Reach Dam. If cumulative adult counts at Rocky Reach Dam are less than 40% of the 10-year average, then broodstock collection will cease unit the 40% escapement level has been reached. All collection will occur in the east ladder trap with the west ladder only used if difficulties are encounter in the east ladder. Any trapping at the west ladder would need to be consistent with trapping for endangered steelhead programs. Jack Chinook are collected in proportion to the run-at-large. The broodstock collection protocols will be reviewed annually.

To implement the current Similkameen Pond program, broodstock are collected at the Wells Dam east ladder trap from mid-July through August 28th then immediately transported to Eastbank Hatchery for holding and maturing. In taking broodstock, there in no protocol for selecting for or against any particular trait. The program has specific protocols that ensure broodstock collection does not adversely affect natural spawning goals (WDFW 1999). Adults are primarily spawned from late September through late October. Eggs are placed in Heath stack incubators. About 85% of fertilized eggs survive to fry ponding. Rearing of juveniles is performed in raceways following loading densities of 6 lbs./gpm and 0.75 lbs./cu. ft. (WDFW 1999). Until capabilities are developed for broodstock collection in the Okanogan River, early arriving summer/fall Chinook broodstock for the Okanogan and Methow subbasins will be collected jointly each year. Dates and times of collection will remain as currently specified. The new broodstock objective will increase to 1,070 fish to achieve a total program of 1,876,000 yearlings and subyearlings. The collection of early-arriving summer/fall Chinook broodstock must be based on the run size at Wells Dam. The run at Rocky Reach Dam is also critical as it provides an estimate of the anticipated run at Wells Dam. Escapement goal for early-arriving summer/fall Chinook past Wells Dam: 3,500, the broodstock objective at Wells Dam is 1,070 for a total of 4,570 broodstock.

7.3 Identity.

The Okanogan and Methow populations had been managed as a single entity with a common hatchery broodstock with the current propagation program using broodstock collected at Wells Dam from mid July through August 28th, a combination of Chinook destined for the Okanogan and Methow rivers (and perhaps Columbia River). The Similkameen Pond program has successfully increased the abundance of the naturally spawning Chinook as evidenced by the high proportion of hatchery fish in the spawning population. The resulting population of hatchery-origin and natural-origin fish is fully integrated. The Okanogan sub-basin population of summer/fall Chinook is a fully integrated between the natural and hatchery origin fish. The later-arriving component of the Okanogan summer/fall Chinook population has been severely depressed due to mortalities imposed by passage through nine mainstem dams, higher harvest rates on these fish in lower river fall Chinook fisheries, and the lack of artificial propagation. This component of the run is proposed by intensive propagation to restore its abundance (CCT 2004a).

All hatchery-origin summer/fall Chinook released from Wells Dam, in the Methow sub-basin, and in the Okanogan sub-basin are adipose-fin clipped to differentiate them from natural-origin fish. This marking scheme will be continued for all summer/fall Chinook production in the Okanogan sub-basin and for releases in the Columbia River below Chief Joseph Dam. During the July and August broodstock collection period at Wells Dam, no other Chinook populations are present in the project area (Brown 2001). Methow spring Chinook will have already migrated into that sub-basin. Spring Chinook returning to the Okanogan River and Chief Joseph Dam Hatchery in the future will have migrated past Wells Dam and into the Okanogan River, the hatchery, or harvest gear. Also, no other Chinook should be present at Wells Dam during the September through November broodstock collection period for later-arriving summer/fall Chinook. With collection at Wells Dam, there is no differentiation between the Okanogan and Methow populations. Collection of summer/fall Chinook destined for the Okanogan sub-basin is intended to be undertaken in that sub-basin to develop a unique broodstock adapted to the Okanogan's specific habitat.

7.4 Proposed number to be collected:

7.4.1 Program goal (assuming 1:1 sex ratio for adults): The Okanogan/Methow early-arriving summer/fall Chinook program takes its broodstock from the east ladder at Wells Dam. The trapping goal has been 560 fish equally divided by sex.

7.4.2 Broodstock collection levels for the last twelve years (e.g. 1990-2001), or for most recent years available.

Year	Adults		
	Females	Males	Jacks
Planned	278	278	
1990	240	166	33
1991	304	215	20
1992	254	220	48
1993	281	386	61
1994	257	296	32
1995	251	163	1
1996	229	280	4
1997	226	190	41
1998	202	163	7
1999	253	251	9
2000	210	252	8
2001	151	246	17
2002	233	231	27
2003	237	237	16
2004	231	264	26
2005	-	-	-

7.5 Disposition of hatchery-origin fish collected in surplus of broodstock needs.

All hatchery-origin fish trapped in excess of program needs will be released and allowed to continue their upriver migration. The Tribes are, however, also planning to develop live-capture, selective fishing gear to harvest hatchery-origin Chinook upstream of Wells Dam in excess of escapement needs.

7.6 Fish transportation and holding methods.

Early-arriving summer/fall Chinook for the Methow and Similkameens program are trapped at Wells Dam and held to maturity in an adult holding pond at Eastbank Hatchery.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Available Flow (gpm)
1	Concrete Pond- Eastbank Hatchery	2120	58	9.75	3.75	500-550

7.7 Describe fish health maintenance and sanitation procedures applied.

The Columbia River watershed is a single "Fish Health Management Zone" under the "Salmonid Disease Control Policy of the Fisheries Co-managers of Washington State" (NWIFC and WDFW 1998), and transfers of salmon within the same zone are allowed from a fish disease management perspective. Regulated pathogens include bacterial kidney disease (BKD), which occurs routinely at virtually all of the facilities that rear chinook salmon, and the pathogen is ubiquitous in Columbia River basin chinook salmon populations, and infectious hematopoietic necrosis virus (IHNV), which has also been identified in adult chinook salmon returning to hatchery facilities in the UCR basin. North American viral hemorrhagic septicemia virus (VHSV) is also regulated, as is *Myxobolus cerebralis* (the protozoan causing whirling disease) which has not been found in the UCR basin. The proposed artificial propagation program will be operated to comply with these guidelines. In addition, fish health protocols will be followed in accordance with Pacific Northwest Fish Health Protection Committee (PNFHPC 1989) and Integrated Hatchery Operations Team (IHOT 1995) guidelines for all programs.

For all production programs under the Mid-Columbia Hatchery Program, standard fish health monitoring will be conducted (monthly checks of salmon and steelhead) by fish health specialist, with intensified efforts to monitor presence of specific pathogens that are known to occur in the donor populations (specific reactive and proactive strategies for disease control and prevention are outlined in Appendix I). Significant fish mortality to unknown cause(s) will be sampled for histopathological study. Fish health maintenance strategies are described in IHOT (1995). Incidence of viral pathogens in salmon and steelhead broodstock will be determined by sampling fish at spawning in accordance with the Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State. Populations of particular concern may be sampled at the 100% level and may require segregation of eggs/progeny in early incubation or rearing. Incidence of *Renibacterium salmoninarum* (Rs, causative agent of bacterial kidney disease) in salmon broodstock will also be determined by sampling fish at spawning. Where appropriate, collected broodstock will be sampled for enzyme-linked immunosorbent assay (ELISA). If required, hatchery staff will segregate eggs/progeny based on levels of Rs antigen, protecting "low/negative" progeny from the potential horizontal transmission of Rs bacteria from "high" progeny. Progeny of any segregation study will also be tested by ELISA; at a minimum each segregation group would be sampled at release. Necropsy based condition assessments (based on organosomatic indices) will be used to assess condition of hatchery reared salmon and steelhead smolts at release, and wild salmon and steelhead during out migration. If needed, condition assessments will be done at other key times during hatchery rearing.

Integrated Hatchery Operations Team (IHOT), Pacific Northwest Fish Health Protection committee (PNFHPC), WDFW's Fish Health Manual November 1966, updated March 30, 1998 or Co-manager guidelines are followed. Fish health procedures used for disease prevention includes biological sampling of spawners, and (in 1992) prophylactic treatment of spawners with an approved therapeutant. Generally, sixty ovarian fluid and kidney/spleen samples are collected from female spawners to test for the presence of viral pathogens. The enzyme-linked immunosorbent assay (ELISA) is conducted on kidney samples from 100 females. This assay detects the antigen for *Renibacterium salmonarium*, the causative agent of bacterial kidney disease (BKD).

Therapeutic and Prophylactic Treatments:

- Adult fall chinook are injected with antibiotics for the control of bacterial diseases.
- At spawning, eggs will be water-hardened in iodophor as a disinfectant.
- Juvenile fish will be administered antibiotics orally for the control of bacterial infections.
- Formalin (37% formaldehyde) is dispensed into water for control of parasites on fungus on eggs, juveniles and adult salmon. Treatment dosage and time of exposure varies with species, life-stage and condition being treated.
- Only therapeutants approved by the U.S. Food and Drug Administration will be used for treatments.

7.8 Disposition of carcasses.

Carcasses of summer chinook spawned through the programs are buried on-site at Eastbank Hatchery or Wells Hatchery or returned to the Wenatchee, Methow, or Columbia River near the tail-race of Wells Dam for nutrient enrichment and productivity enhancement purposes.

7.9 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

Listed fish are not propagated. To eliminate adverse effects on the natural summer chinook population, and on listed fish that may be encountered incidentally during trapping, are minimized through the following measures:

1. The east ladder (and west ladder) trap(s) will be continuously monitored and operated 3 days per week during the summer chinook migration (June 28 through August 28). The east and West ladder traps are actively manned during trapping and checked at least daily, ensuring minimal holding times for fish captured.
2. The Wells Hatchery trap does not incorporate a fish weir to guide fish into the hatchery fish ladder. All fish returning to Wells Hatchery recruit to the trap as volunteers. The trapping program is therefore not a "run of the river" operation, and captures of other species besides summer chinook salmon that were produced at the hatchery are minimal.
3. To minimize migration delays to fish other than the targeted species, the fish sorting flume in the east ladder trap will be staffed at all times while the fishway is barricaded for the purpose of guiding fish into the trap.
4. Attraction flows from the false weir will be maintained to encourage fish to use the sorting flume.

1. The traps will be operated in a manner to reduce retention time in the holding pools above the *Denil* fishways accessing the trap.
2. Fish not required for broodstock will be returned into the fishway as they move through the sorting flumes to continue their upstream migration.

Section 8. Mating

8.1 Selection method.

Spawners are collected randomly from the run at large arriving at the trapping locations during the July - August summer chinook salmon migration period. Beginning (late June or early July) and ending (late August) dates set for trapping help ensure that only summer chinook salmon are used in these programs. Adult collection at Wells Dam is managed throughout the season in response to fish counts at Rocky Reach Dam to ensure adequate escapement above Wells Dam. A portion of each day's egg-take is used for on-site production at Wells Hatchery to help ensure that the hatchery broodstock remains genetically similar to, and representative of, the up-river summer chinook populations. A portion of each days egg-take is used for on site production to help ensure that the hatchery broodstock remains genetically similar to, and representative of, the up-river summer chinook populations.

8.2 Males.

A 1:1 mating scheme is used for summer/fall chinook. Males may be live-spawned on the first spawning day as necessary to make up for a low male to female ratio. Inclusion of jacks in the run-at-large broodstock collection helps to alleviate occasional low adult male occurrence (Brown 2001).

8.3 Fertilization.

Summer/fall Chinook collected at Wells Dam are held and spawned at Eastbank Hatchery separately from other Chinook broodstock. Fish health procedures used for disease prevention include biological sampling of spawners. Generally sixty ovarian fluid and kidney/spleen samples are collected from female spawners to test for the presence of viral pathogens (Brown 2001). The enzymelinked immunosorbent assay (ELISA) is now conducted on kidney samples from all female adults whose progeny are expected to go into the yearling program (Foster, J 2003).

8.4 Cryopreserved gametes.

Cryopreserved gametes are not used.

8.5 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.

Methow/Okanogan Summer Chinook Salmon -

1) Trap no more than 20 % of the adult run, based on counts at Rocky Reach Dam:
2) If cumulative adult counts at Rocky Reach Dam are less than 40 % of the ten-year average, cease trapping until the 40 % escapement level has been reached;
3) Begin trapping after June 28 and end trapping on or before August 28;
4) Conduct trapping Monday through Wendesday each week;
5) Do not use the west ladder on Wells Dam for broodstock collections unless difficulties are encountered with broodstock collections in the east ladder;
6)
7) Collect jacks in similar proportion to the run-at-large. Adult Summer Chinook for the program are collected in the East Bank Ladder at Wells Dam. At the Wells east ladder trap, the fish ladder closes above a large holding area from which fish ascending a denil fishway and false weir are diverted via a chute directly into a truck-mounted anesthetic tank. There is no netting or other handling of fish trapped at the east ladder prior to being anesthetized, after which they can be tagged, recovered, and/or placed in transport trucks. The risk of injury to fish is minimized

through application of these measures.

8) A portion of each days egg-take is used for on site production to help ensure that the hatchery broodstock remains genetically similar to, and representative of, the up-river summer chinook populations. A 1:1 mating scheme is employed.
9) Males may be live-spawned on the first spawning day as necessary to make up for a low naturally-occurring male to female ratio. However, inclusion of jack chinook in the run-at-large broodstock collections helps to alleviate occasional low adult male occurrence.
10) Collect jacks in similar proportion to the run-at-large. Inclusion of jack chinook in the run-at-large broodstock collections helps to alleviate occasional low adult male occurrence. The hatchery broodstock remains genetically similar to, and representative of, the up-river summer chinook populations.
11) Fish health procedures used for disease prevention include biological sampling of spawners. Generally, sixty ovarian fluid and kidney/spleen samples are collected from female spawners to test for the presence of viral pathogens. The enzyme-linked immunosorbent assay (ELISA) is conducted on kidney samples from 100 females. This assay detects the antigen for *Renibacterium salmonarium*, the causative agent of bacterial kidney disease (BKD).

Section 9. Incubation and Rearing.

9.1.1 Number of eggs taken and survival rates to eye-up and/or ponding.

Eggtake goal is 1,251,000 (FBD 2005). Fecundity comparisons are provided in Table 10.

Year	Egg Take	Green-Eyed Survival (%)	Eyed-Ponding Survival (%)	Egg Survival Perfor-mance Std.	Fry-fingerling Survival (%)	Rearing Survival Perfor-mance Std.	Fingerling-Smolt Survival (%)
1990	1,160,241	84.9	97.1	98.0	97.6	72.0	99.5
1991	1,466,486	88.2	97.1	98.0	96.4	72.0	99.6
1992	827,911	87.0	98.0	98.0	84.9	72.0	98.3
1993	1,328,577	85.4	97.7	98.0	99.5	72.0	99.4
1994	1,488,476	86.6	100.0	98.0	73.2	72.0	99.1
1995	1,227,500	98.2	84.1	98.0	92.8	72.0	89.6
1996	1,120,000	83.2	100.0	98.0	86.6	72.0	89.0
1997	1,164,665	86.1	98.4	98.0	97.2	72.0	99.7
1998	973,364	54.1	98.0	98.0	98.4	72.0	99.9
1999	1,209,315	92.9	96.9	98.0	96.9	72.0	99.9
2000	1,048,671	89.2	98.5	98.0	97.6	72.0	94.4
2001	698,179	U	U	98.0	U	72.0	U
2002	1,147,500	U	U	98.0	U	72.0	U
2003	1,175,000	U	U	98.0	U	72.0	U
2004	1,327,500	U	U	98.0	U	72.0	U

The program survival standard from fertilization to ponding is 90.0 %. The survival objective from fertilization to release is 65.0 %. The egg survival objective: green egg to the eyed stage is 92.0 %; the eyed egg stage to ponding is 98.0 %; 30 days post ponding is 97.0; 100 days post ponding is 93.0; and ponding to smolt is 72%.

Table 10. Fecundity for Summer Chinook in the Upper Columbia (WDFW Database 2005).

Stock	Field	1999	2000	2001	2002	2003	5 YR Avg.
MEOK	Females Spawned	254	210	152	233	237	217
	Estimated Egg Take	1,246,450	1,038,800	750,000	1,147,500	1,175,000	1,071,550
	Fecundity	4,907	4,947	4,934	4,925	4,958	4,933
Wells	Females Spawned	503	564	525	577	575	548
	Estimated Egg Take	2,475,000	2,780,000	2,620,000	2,850,000	2,850,000	2,715,000
	Fecundity	4,920	4,929	4,990	4,939	4,957	4,947
Wenat-chee	Females Spawned	247	211	152	204	171	197
	Estimated Egg Take	1,220,050	1,040,000	745,200	972,500	847,500	965,050
	Fecundity	4,939	4,929	4,903	4,767	4,956	4,899

9.1.2 Cause for, and disposition of surplus egg takes.

The summer/fall Chinook programs may take up to 10% surplus eggs to ensure program release goals are met. The number of surplus eggs will be based on program performance and the greater need of ensuring adequate escapement to the spawning grounds. WDFW is not authorized to destroy excess gametes or fish. This rule applies to the early-arriving summer/fall Chinook reared at Eastbank Hatchery. The take of surplus eggs will be minimized when program survival levels are determined and stabilized.

9.1.3 Loading densities applied during incubation.

Integrated Hatchery Operations Team (IHOT) species-specific incubation recommendations were followed for water quality, flows, temperature, substrate and incubator capacities. Heath stack incubators are used to incubate the summer chinook eggs at Eastbank Hatchery and Wells Hatchery. Incubation conditions at the two hatcheries are designed on loading densities recommended by Piper et al. (1982).

9.1.4 Incubation conditions.

Influent and effluent gas concentrations at the hatcheries and within the acclimation ponds, including dissolved oxygen concentrations, are within parameters optimal for juvenile salmonid production and survival. For Eastbank Hatchery, influent and effluent gas concentrations, including dissolved oxygen concentrations, are measured and within parameters optimal for salmonid egg and juvenile fish survival (Brown 2001). Eastbank Hatchery has adult holding pond space for the Wenatchee and Wells east ladder trapped fish (Methow/Okanogan) summer chinook broodstock, 70 half-stacks of vertical incubators equipped with a chilled water supply, eight 3,750 cu ft raceways and five 22,200 cu ft raceways (Chapman et al. 1994). This water varies in temperature from a low of 46° F in May to a high of 57° F in December.

9.1.5 Ponding.

Eastbank Hatchery: Summer/fall Chinook fry are transferred from Heath trays for ponding upon button-up and swim-up. Ponding generally occurs after the accumulation of 1,650-1,750 temperature units. Unfed fry are transferred to the ponds from early May through early June. The normal weight for fry initially ponded for brood years 1989-95 was 0.45 grams (1,000 fish per pound). Fry fork length was 36-40 mm (Brown 2001).

9.1.6 Fish health maintenance and monitoring.

No fish disease outbreaks have been experienced during the incubation to ponding period in the summer chinook programs in recent years and mortality levels have remained within program standards. Fish health is continuously monitored in compliance with Co-manager Fish Health Policy standards (WDFW and WWTIT 1998). Rearing space at Eastbank was designed to maintain maximum loading densities below the criteria of Piper et al. (1982), as modified by Wood (Chelan PUD and CH2MHILL 1988).

9.1.7 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.

No listed fish are reared in this program.

9.2.1 Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1990-2001), or for years dependable data are available.

The program survival standard from fertilization to ponding is 90.0 %. The survival objective from fertilization to release is 65.0 %. The egg survival objective: green egg to the eyed stage is 92.0 %; the eyed egg stage to ponding is 98.0 %; 30 days post ponding is 97.0; 100 days post ponding is 93.0; and ponding to smolt is 72%. Data from the Wenatchee and Methow/Okanogan brood years through 1995 is compared in Table 11.

Table 11. Wenatchee and Methow/Okanogan summer chinook program survival summary by life stage (1989-1993 brood years).

Percent survival by life stage		Brood Year				
		1991	1992	1993	1994	1995
Adult (holding)	Wenatchee	90.7	85.7	95.4	94.5	94.7
	Methow/Okanogan	92.4	95.0	83.7	83.1	89.3
Egg	Wenatchee	86.9	79.7	81.7	83.7	86.0
	Methow/Okanogan	88.2	87.0	83.0	86.6	82.3
Fry	Wenatchee	96.6	97.8	99.6	99.2	96.7
	Methow/Okanogan	97.1	98.0	99.8	98.1	96.5
Rearing	Wenatchee	95.7	97.2	98.1	92.3	71.3
	Methow/Okanogan	98.4	95.5	99.5	70.6	89.0
Overall (fertilization to release)						
	Wenatchee	**80.3**	**75.5**	**79.4**	**79.8**	**64.4**
	Methow/Okanogan	**84.2**	**78.2**	**76.7**	**63.3**	**76.6**

9.2.2 Density and loading criteria (goals and actual levels).

The rearing conditions at Wells and Eastbank hatcheries (as well as its acclimation ponds) are designed on loading densities recommended by Piper et al. (1982; 6 lb/gpm and 0.75 lb/ft3) and Banks (1994; 0.125 lb/ft3/in) (BAMP 1998). Fry are transferred from the Heath incubation trays to fiberglass rearing tanks for start feeding, and then to raceways for continued rearing. The tanks have flow through water circulation. Fingerlings are transferred to the acclimation ponds in the tributaries in October (Carlton Ponds) and February (Dryden and Similkameen).

Eastbank Hatchery: Rearing conditions are designed on loading densities recommended by Piper et al. (1982) of 6 lbs/gpm and 0.75 lb/cubic foot (Brown 1999).

Carlton Pond: Rearing conditions are designed on loading densities recommended by Piper et al. (1982) of 6 lbs/gpm and 0.75 lb/cubic foot (Brown 1999).

Similkameen Pond: The Pond was designed based on rearing densities of Piper (1982). However, the summer Chinook program of 576,000 fish will be split, with 200,000 going to Bonaparte Pond.

This will result in reduced rearing densities at Similkameen Pond, down to 4 lbs/gpm and 0.49 lbs/cubic foot at time of release (assuming 10 fpp).

Bonaparte Pond: With 200,000 summer Chinook at a release size of 10 fpp, rearing densities could be as low as 1.8 lbs/gpm and 0.26 lbs/cubic foot. Flow rates and water depth in the pond could be reduced to save on pumping costs, in which case loading rates would be closer to Piper's criteria.

9.2.3 Fish rearing conditions.

Influent and effluent gas concentrations at the hatchery, including dissolved oxygen concentrations, are within parameters optimal for juvenile salmonid production (Brown 1999). Temperature, dissolved oxygen and pond turn over rate are monitored. IHOT standards are followed for: water quality, alarm systems, predator control measures (netting) to provide the necessary security for the cultured stock, loading and density. Settleable solids, unused feed and feces are removed regularly to ensure proper cleanliness of rearing containers. All ponds are broom cleaned as needed and vacuumed monthly for the yearling pond. Ponds are pressure washed between broods. Temperature and dissolved oxygen are monitored and recorded daily during fish rearing. Temperatures during the rearing cycle range from a high of 60 degrees F to a low of 33 degrees F.

Eastbank Hatchery: Influent and effluent gas concentrations at the hatchery, including dissolved oxygen concentrations, are within parameters optimal for juvenile salmonid production (Brown 1999).

Carlton Pond: Influent and effluent gas concentrations at the acclimation pond, including dissolved oxygen concentrations, are within parameters optimal for juvenile salmonid production (Brown 1999).

Similkameen Pond: Influent and effluent gas concentrations at the acclimation pond, including dissolved oxygen concentrations, are within parameters optimal for juvenile salmonid production (Brown 1999).

Bonaparte Pond: Influent and effluent gas concentrations and temperatures will be constantly monitored following best hatchery management practices.

9.2.4 Indicate biweekly or monthly fish growth information (average program performance), including length, weight, and condition factor data collected during rearing, if available.

The normal weight for fry initially ponded at Eastbank Hatchery for brood years 1989-95 was 0.45 grams (1000 fish per pound). The fry fork length recorded for the same brood years was 36 to 40 mm.

Table 12. Length, weight, and condition factor data for 1995 brood summer chinook reared through the Wenatchee supplementation program (Eastbank over-winter to Dryden Pond) (from Petersen et al. 1999b).

Date	Fork Length mm	Fork Length SD	Fork Length CV %	Weight (gms)	Condition Factor (Kfl)
June 29	44.2	2.13	4.8	0.9	1.0
Aug. 1	59.4	4.24	7.1	2.3	1.1
Sept. 1	72.1	4.30	6.0	4.1	1.1
Sept. 27	77.6	7.55	9.7	5.9	1.3
Oct. 24	93.7	8.23	8.8	9.1	1.1
Oct. 31	96.5	10.50	10.9	10.2	1.1
Nov. 30	103.5	13.54	13.1	12.9	1.2
Jan. 1	114.0	16.74	14.7	19.1	1.3
Feb. 1	123.9	24.798	20.0	25.4	1.3
Feb. 26	126.7	20.43	16.1	23.1	1.1
Feb. 28	123.3	23.59	19.1	24.4	1.3
Apr. 4	133.8	17.44	13.0	27.7	1.2
May 6	149.4	22.68	15.2	42.4	1.3

Table 13. Length, weight, and condition factor data for 1995 brood summer chinook reared through the Methow/Okanogan supplementation program (from Petersen et al. 1999b).

Date	Fork Length mm	Fork Length SD	Fork Length CV %	Weight (gms)	Condition Factor (Kfl)
Carlton Pond					
June 29	41.0	2.13	5.2	0.6	0.91
July 31	55.0	3.34	6.1	1.8	1.07
Aug. 30	65.5	4.31	6.6	3.2	1.13
Sept. 27	76.0	5.92	7.8	5.2	1.19
Oct. 31	91.6	7.19	7.9	7.9	1.03
Nov. 30	111.9	8.90	8.0	15.2	1.08
Jan. 1	112.2	13.61	12.1	16.8	1.07
Jan. 31	143.4	11.68	8.2	33.6	1.14
Mar 3	142.5	23.81	16.7	34.9	1.21
Mar. 18	148.5	25.09	16.9	39.9	1.22
Apr. 22	160.3	22.96	14.3	50.5	1.23
Similkameen Pond					
May 31	40.2	1.64	4.1	0.6	0.9
June 29	50.5	2.89	5.7	1.3	1.01
Aug. 1	66.8	6.18	9.3	3.6	1.2
Sept. 2	86.0	7.25	8.4	7.9	1.3
Sept. 27	105.1	8.4	8.0	15.2	1.3
Sept. 30	106.5	8.17	7.7	12.9	1.1
Oct. 31	128.5	8.61	6.7	25.4	1.2
Nov. 5	128.7	8.41	6.5	25.5	1.2
Dec. 3	133.8	9.25	6.9	27.5	1.2
Jan. 3	135.3	10.31	7.6	27.1	1.1
Feb. 4	134.6	10.07	7.5	25.2	1.0
Mar. 31	136.7	13.87	10.2	32.8	1.3

9.2.5 Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available.

Table 14. Results of organosomatic index (OSI) sampling conducted on 1995 brood juvenile Wenatchee and Methow/Okanogan summer chinook salmon (from Petersen et al. 1999b).

Date	Specific Indices (%) mesenteric fat	Combined Indices (%) normality	feeding	Blood Constituents Hematocrit % volume (SD)	Leucocrit (SD)	Plasma Protein g/100 ml
Wenatchee						
Feb. 26	68.8	85.5	28.3	50.70 (6.14)	0.10 (0.00)	6.28 (0.57)
Mar. 4	42.5	100.0	58.3	50.60 (5.72)	0.10 (0.00)	5.72 (0.47)
May 6	30.0	9725	75.0	47.20 (5.55)	0.33 (0.27)	4.50 (1.78)
Carlton						
Oct. 22	42.5	100.0	38.3	49.8 (5.9)	0.3 (0.2)	6.5 (1.2)
Mar. 18	65.0	92.5	33.3	45.4 (5.0)	0.1 (0.1)	5.2 (0.6)
Apr. 8	35.0	92.5	40.0	50.2 (4.1)	1.0 (0.0)	4.9 (0.8)
Apr. 22	56.3	96.0	21.7	49.8 (4.5)	0.5 (0.3)	5.4 (0.8)
Similkameen						
Sept. 27	63.8	98.5	80.7	47.8 (4.6)	0.2 (0.2)	6.7 (0.9)
Mar. 31	31.3	95.5	86.7	52.4 (7.4)	0.7 (0.2)	6.0 (0.7)

9.2.6 Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).

Rearing Period	Food Type	Application Schedule (#feedings/day)	Feeding Rate Range (%B.W./day)	Lbs. Fed Per gpm of Inflow	Food Conversion During Period
Ponding to 400 fpp	BioDiet Starter 3	24	2.5-4.0	0.0011	0.7
400-300 fpp	BioMoist Grower 1.0 mm	12	2.5	0.0021	0.75
300-180 fpp	BioMoist Grower 1.3 mm	4	2.3	0.0034	0.75
180-100 fpp	BioMoist Grower 1.5 mm	1	2.3	0.0284	0.8

100-45 fpp	BioMoist Grower 2.0 mm	1	2.2	0.0221	0.9
45-12 fpp	BioMoist Grower 2.5 mm	1	1.7	0.0157	0.9

9.2.7 Fish health monitoring, disease treatment, and sanitation procedures.

For all production programs under the Mid-Columbia Hatchery Program, standard fish health monitoring will be conducted (monthly checks of salmon and steelhead) by fish health specialist, with intensified efforts to monitor presence of specific pathogens that are known to occur in the donor populations (specific reactive and proactive strategies for disease control and prevention are outlined in Appendix I). Significant fish mortality to unknown cause(s) will be sampled for histopathological study. Fish health maintenance strategies are described in IHOT (1995). Incidence of viral pathogens in salmon and steelhead broodstock will be determined by sampling fish at spawning in accordance with the Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State. Populations of particular concern may be sampled at the 100% level and may require segregation of eggs/progeny in early incubation or rearing. Incidence of *Renibacterium salmoninarum* (Rs, causative agent of bacterial kidney disease) in salmon broodstock will also be determined by sampling fish at spawning. Where appropriate, collected broodstock will be sampled for enzyme-linked immunosorbent assay (ELISA). If required, hatchery staff will segregate eggs/progeny based on levels of Rs antigen, protecting low/negative" progeny from the potential horizontal transmission of Rs bacteria from "high" progeny. Progeny of any segregation study will also be tested by ELISA; at a minimum each segregation group would be sampled at release. Necropsybased condition assessments (based on organosomatic indices) will be used to assess condition of hatcheryreared salmon and steelhead smolts at release, and wild salmon and steelhead during outmigration. If needed, condition assessments will be done at other key times during hatchery rearing.

Fish health and disease condition are continuously monitored in compliance with Co-manager Fish Health Policy standards (WDFW and WWTIT 1998). Fish health and condition is onitored on-site by fish health professionals at the summer chinook rearing locations ten to fifteen times during the freshwater rearing period. In particular, summer chinook are screened prior to transfer and again at release for the incidence of bacterial kidney disease (BKD) through the ELISA process. Results of ELISA testing of `95 brood summer chinook indicate that the prevalence of BKD in the Wenatchee population was very low. The prevalence of BKD in the `95 brood Carlton Pond population was higher than the Similkameen Pond population. The `95 brood Carlton Program failed to meet the numerical release objective because of a BKD outbreak at Methow Hatchery, from which the smolts were transferred. The results of fish health monitoring for the summer chinook programs are presented each year in WDFW Rock Island Fish Hatchery Complex annual reports.

The general policy of the WDFW, the USFWS, and the Yakama Nation is to bury juvenile fish mortalities, and dead eggs to minimize the risk of disease transmission to natural fish. The action agencies may place at least some of the adult salmon carcasses in regional streams for nutrient enrichment purposes, consistent with permitting and disease certification protocols. If adult carcasses are not used for nutrient enhancement they will be buried or disposed of at a local waste disposal site. The distributing of spawned, dead carcasses into the natural environment should benefit natural fish productivity through nutrient enrichment. NMFS finds that risk to the listed populations is minimal if disease certification protocols are followed.

9.2.8 Smolt development indices (e.g. gill ATPase activity), if applicable.

Degree of smoltification is monitored through monthly collection of data indicating average condition factor (Kfl) of the populations. Gill ATPase levels have been monitored in the past to attempt to indicate degree of smoltification. However, this index has not been found to be a useful tool for determining when to begin releases, due to the delay in obtaining results from sampling, and the finding that ATPase levels do not actually increase until the smolts are actively migrating in the Columbia River (Petersen et al. 1999b)

Eastbank Hatchery: Degree of smoltification is monitored through monthly collection of data indicating average condition factor (Kfl). Gill ATPase levels have been monitored in the past, however this index has not been found to be useful for determining when to begin fish releases due to delays in obtaining results and the finding that ATPase levels do not actually increase until the smolts are actively migrating in the Columbia River.

Carlton Pond: Degree of smoltification is monitored through monthly collection of data indicating average condition factor (Kfl). Gill ATPase levels have been monitored in the past, however this index has not been found to be useful for determining when to begin fish releases due to delays in obtaining results and the finding that ATPase levels do not actually increase until the smolts are actively migrating in the Columbia River. For more information see Brown (1999).

Similkameen Pond: Degree of smoltification is monitored through monthly collection of data indicating average condition factor (Kfl). Gill ATPase levels have been monitored in the past, however this index has not been found to be useful for determining when to begin fish releases due to delays in obtaining results and the finding that ATPase levels do not actually increase until the smolts are actively migrating in the Columbia River. For more information see Brown (1999).

Bonaparte Pond: This will be a new program. No data are available.

9.2.9 Indicate the use of "natural" rearing methods as applied in the program.

Natural rearing methods are approached through the transfer of most summer chinook smolts to acclimation ponds at release locations. The trapizoidal, hypalon-lined ponds provide a lower density rearing location for the fish on their home water. The ponds therefore provide a more natural setting for the populations than if the fish were retained in concrete raceways, and released at central locations or scatter-planted to the upper river tributaries.

Carlton Pond: Summer Chinook are reared in lower densities than at the hatchery and a more natural setting than concrete raceways. Fish are also reared on their “home” waters (Brown, 1999). This facility may serve as a control for testing of NATURES techniques at other facilities .

Similkameen Pond: Summer Chinook are reared in lower densities than at the hatchery and a more natural setting than concrete raceways. Fish are also reared on their “home” waters (Brown, 1999). This facility may serve as a control for testing of NATURES techniques at other facilities .

Bonaparte Pond: Fish will be reared at very low densities and at high flow rates on home waters, see Section 9.2.2. NATURES techniques may be tested here.

9.2.10 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.

Listed fish are not under propagation.

Section 10. Release

10.1 Proposed fish release levels.

Methow River - Up to 400,000 10 fpp are released from Carlton Pond.

Similkameen River - Up to 576,000 10 fpp are released from Similkameen Pond. (100,000 can be acclimated at Bonaparte Pond when on-line)

10.2 Specific location(s) of proposed release(s).

Stream, river, or watercourse: Methow River
Release point: Carlton Pond, rm 56.4 (rkm 90.2)
Major watershed: Methow River
Basin or Region: Columbia River

Stream, river, or watercourse: Similkameen River
Release point: Similkameen Pond, rm 3.1 (rkm 5)
Major watershed: Okanogan River
Basin or Region: Columbia River

Stream, river, or watercourse: Okanogan River
Release point: Bonaparte Pond, rm 56 (rkm 90.2)
Major watershed: Okanogan River
Basin or Region: Columbia River

10.3 Actual numbers and sizes of fish released by age class through the program.

Release Year	**Carlton Pond**			**Similkameen River**		
	No.	Date (MM/DD)	Avg Size (fpp)	No.	Date (MM/DD)	Avg Size (fpp)
1991	420,000	April 23-May 20	10.0	353,000	April 8-April 9	11.0 fpp
1992	391,650	April 14-May 8	13.0	540,000	March 24 – April 7	12.0 fpp
1993	540,900	April 5-May 12	10.0	676,000	April 1	20.0 fpp
1994	402,641	April 21-22	13.0	548,000	March 21 – April 23	18.0 fpp
1995	433,375	April 24-May 11	13.0	586,000	March 1	13.0 fpp
1996	406,560	April 26-30	13.0	536,000	March 13	13.0 fpp
1997	353,182	April 8 and April 20	12.0 and 9.0	587,000	April 1	13.8 fpp

1998	298,844	April 14	4.0	507,913	March 13-18	17.7fpp
1999	384,909	April 15	11.0	590,000	April 12-26	11.0 fpp
2000	205,269	May 2	9.0	293,064	April 13-26	9.0 fpp
2001	424,363	April 18	11.0	630,463	April 11-25	12.8 fpp
2002	336,762	May 5	8.0	532,000		22.3 fpp
2003	248,595	April 24	8.1	26,642[1]	April 28-29	17.7 fpp
2004	313,583	April 24	12.0	247,631 10,000[2]	April 17-30 April 12	21.8 fpp 38.7 fpp
2005						

[1]Loss due to a parasitic infestation (*Ichthyophthirius multifilis)*,See also Section 5.7.
[2]Releases to the Okanogan River

10.4 Actual dates of release and description of release protocols.

Summer chinook yearlings are forced released from Carlton Pond in mid- to late April. Program fish are released within the out-migration period of natural summer chinook above Wells Dam.

For Similkameen Pond summer/fall Chinook program:
2002: 4/08/02 – 4/08/02 forced release due to Dermostidium infection*
2001: 4/11/01 – 4/25/01 volitional then forced.
2000: 4/13/00 – 4/26/00 volitional then forced.
1999: 4/12/99 – 4/26/99 volitional then forced.
1998: 3/13/98 – 3/18/98 released early due to Bacterial Gill Disease*
* from Foster (2003)

10.5 Fish transportation procedures, if applicable.

Equipment Type	Capacity (gallons)	Supp. Oxygen (y/n)	Temp. Control (y/n)	Norm. Transit Time (minutes)	Chemical(s) Used	Dosage (ppm)
Tanker Truck (Juvenile/Smolt Hauling-Carlton Satellite)	2500	Y	N	90	MS 220 and NaCl	5-1.0% (NaCl)

10.6 Acclimation procedures (*methods applied and length of time*).

Summer chinook are transferred as fingerlings or sub-yearlings to acclimation ponds in the Methow, and Similkameen (Okanogan River) drainages in the fall (September or October) or if needed late winter (February or March) to acclimate and imprint the fish to the desired up-river return locations.

Methow River - Yearling smolts are transferred from the Eastbank Hatchery to the Carlton Acclimation Satellite (off-stream of the Methow River) in early-mid March; smolts are acclimated and forced released from the Satellite in Mid-April.

Okanaogan River - Chinook are transported from Eastbank Hatchery to Similkameen Pond in October. Early-arriving summer/fall Chinook are reared and acclimated for 6 months. Fish are reared primarily on river water. Bonaparte Pond: Early-arriving summer/fall Chinook will be reared and acclimated for 6 months. Fish will be reared on river water.

10.7 Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

Nearly all summer chinook produced through the WDFW programs in the region are marked with an adipose clip/coded wire tag combination to allow for visual identification of hatchery origin fish upon adult return, differentiation of hatchery fish from wild fish and from hatchery fish from the various release locations, and assessment of brood year fishery contribution and survival rates by release site. The production from Carlton Pond and Similkameen Pond have been 100% CWT and adipose fin clipped.

10.8 Disposition plans for fish identified at the time of release as surplus to programmed or approved levels

At time of release, all fish up to 110% of approved program levels will be released. Fish will not be transported to acclimation sites in excess of 110% of approved programmed levels.

10.9 Fish health certification procedures applied pre-release.

The disease management program will follow the requirements of the "Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State" (Co-managers 1998), requirements of the Section 10 ESA permit issued and guidelines of IHOT (1995). A qualified fish health specialist will conduct monitoring assessments. This monitoring will be conducted at least monthly and more often when necessary. These inspections must adhere to the disease prevention and control guidelines established by the Pacific Northwest Fish Health Protection Committee;

10.10 Emergency release procedures in response to flooding or water system failure.

Carlton Acclimation Facility: In the event of an irresolvable water supply emergency that threatens the health of the Chinook, screens and stoplogs at outlets of rearing pond would be lifted, and fish would be released into the Methow river.

Similkameen Pond: In the event of an irresolvable water supply emergency that threatens the health of the Chinook, screens and stoplogs at outlets of rearing pond would be lifted, the fish will be immediately forced from the rearing pond.

Bonaparte Pond: In the event of an irresolvable water supply emergency that threatens the health of the Chinook, screens and stoplogs at outlets of rearing pond would be lifted, the fish will be immediately forced from the rearing pond.

10.11 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.

Transfer of Chinook to acclimation ponds will occur only after river temperatures in October have declined to safe levels. Transfer to acclimation ponds could be further delayed to prevent disease infections if substantial numbers of naturally-spawned carcasses are present immediately above the a pond's water intake.

Measures have been applied to ensure that artificially propagated summer chinook salmon juveniles that are released are ready to actively migrate to the ocean with minimal delay. To meet this condition, fish must be released at a uniform size and state of smoltification that ensures that the fish will migrate seaward without delay. Variance from this smolts-only release requirement shall only be allowed in the event of an emergency, such as flooding, water loss to raceways, or vandalism, that necessitates early release of ESA-listed steelhead to prevent catastrophic mortality. Any emergency releases made by the action agencies shall be reported immediately to the NMFS Salmon Recovery Division. The rearing and release strategies are designed to limit ecological interactions between hatchery and naturally produced fish. Fish are reared until smoltification has occurred within nearly the entire population, which reduces residence time in streams following release (Bugert et al. 1991). To indicate when fish should be allowed to volitionally migrate, physiological measures of the degree of smoltification within the hatchery population, including allowable fork length coefficient of variation maximums (CV less than 10%) and average condition factor at release targets (0.9 - 1.0) will be used for yearlings while size at time of release (50ffp) will be used for sub-yearling releases.

Through these practices, smolts will migrate seaward without delay, minimizing interactions with listed wild spring chinook and steelhead juveniles and smolts that rear in and/or migrate through freshwater and estuarine areas. In addition, smolt releases will continue to be timed with water budget releases from upstream dams, to further accelerate seaward migration of released hatchery fish and reduce the duration of any interactions with wild fish. On-station rearing of spring chinook on parent river water in the upper Columbia region will also contribute to the smoltification process leading to reduced hatchery fish residence time in the rivers and mainstem migration corridors.

Variance from this smolts-only release requirement shall only be allowed in the event of an emergency, such as flooding, water loss to raceways, or vandalism, that necessitates early release of ESA-listed steelhead to prevent catastrophic mortality. Any emergency steelhead releases made by the action agencies shall be reported immediately to the NMFS Salmon Recovery Division in Portland.

All propagated summer chinook juveniles shall be externally and internally marked (i.e., CWT and adipose fin clipped) prior to release.

Fish have been monitored daily by staff during rearing for signs of disease, through observations of feeding behavior and monitoring of daily mortality trends. A fish health specialist has been monitoring fish health as least monthly. More frequent care will be provided as needed if disease is noted. Prior to release, population health and condition is established by the Area Fish Health Specialist. Adherence to WDFW, Pacific Northwest Fish Health Protection Committee, and IHOT (1995) fish disease control policies will reduce the incidence of diseases in hatchery fish produced and released. Fish health management programs affecting all stocks, and fish health activities specific for each complex, are detailed in Appendix II, under "Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread, or amplification of fish pathogens."

Section 11. Monitoring and Evaluation of Performance Indicators

11.1.1 Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.

Monitoring and evaluation plans, and research projects will be developed by the HCP Hatchery Committees as described in Section 2.3.1 (Chelan and Douglas PUD Activities). Additional details of the monitoring and evaluation plan development time lines and responsibilities are provided in the three HCP agreements. Tasks proposed for consideration at this time, which, in all likelihood, will be included in the plans developed by the HCP Hatchery Committees, include monitoring within the hatchery facilities and monitoring of artificially propagated salmon in the natural environment.

WDFW submits annual reports as conditioned by Section 10 Permit # - 1347 covering the period from January 1- December 31 and due to NOAA Fisheries by January 31st of the year following release per permit Reporting and Annual Authorization Requirements; Section C.1-C.9. Specifically, the annual reports include detailed activities as per requirements including monitoring of performance indicators identified for the program.

Adult return information shall include the most recent annual estimates of the number and proportion of artificially propagated fish on the spawning grounds, and the number and location of artificially propagated adults that were recovered outside the release areas. Adult return information and results from monitoring and evaluation activities outside the hatchery environment should be included in the annual report or a separate report. If a separate report on monitoring and evaluation activities conducted outside the hatchery environment is prepared, it shall be submitted by August 31, of the year following the monitoring and evaluation activities (i.e., surveys conducted in 2003, report due August 31, 2004) to NMFS.

Within Hatchery Environment Monitoring Reporting includes: numbers, pounds, dates, tag/mark information and locations of fish releases; Standard survival benchmarks within the hatchery environment as defined by the HCP Hatchery Committees; Monitoring and evaluation activities that occur within the hatchery environment; Coefficient of variation around the average (target) release size immediately prior to their liberation from the acclimation sites as an indicator of population size uniformity and smoltification status;

Natural Environment Monitoring Reporting includes: Annual adult return information shall include estimates of the number and proportion of artificially propagated fish on the spawning grounds; The number and location of artificially propagated adults that were recovered outside the release areas (e.g., in fisheries or strays to other rivers); Total and index redd counts by tributary basin; Carcass recovery summary which includes sex, origin, tributary location, age, and stock data. Broodstock monitoring and collection summary by location, including summary of all species encountered. Summary of all activities monitoring juvenile UCR spring chinook salmon in the natural environment including trap locations, tributary or sub basin population estimates; Biological sampling conducted on artificially propagated and natural origin juveniles in the natural environment; injuries or mortalities of listed species that result from monitoring activities; and any other information deemed necessary for assessing the program defined by the HCP Hatchery Committees.

The Chelan PUD and Douglas PUD, in coordination with the HCP Hatchery Committees, shall develop five-year monitoring and evaluation plans for the hatchery that are updated every five years. The first monitoring and evaluation plans are due to be completed with in one year of the issuance of the FERC order incorporating the HCP into the hydro project operation licenses. Existing monitoring and evaluation programs shall continue until replaced by the HCP Hatchery Committees newly developed five-year monitoring and evaluation plans. The Chelan PUD and Douglas PUD, shall assume the lead, and work in coordination with the HCP Hatchery Committees, in developing the ten-year hatchery program reviews and directing the development of annual summary reports. The program reviews will determine if egg-to-fry and smolt –to-adult survival rates, and other appropriate hatchery program goals and objectives of the HCPs and the ESA section 10 permits have been met or sufficient process is being made towards their achievement. This review shall include a determination of whether artificially propagated production objectives are being achieved.

WDFW shall develop annual broodstock collection and spawning protocols for the sockeye salmon and chinook salmon artificial propagation programs. Protocols should be coordinated with the co-managers and HCP Hatchery Committees and must be submitted to NMFS by April 15 of the collection year.

The Permit Holders must report the take of any ESA-listed species not included in this permit or authorized under a separate ESA permit, when it is killed, injured, or collected during the course of enhancement/research activities. Notification should be made as soon as possible, but no later than two days after the unauthorized take. The Permit Holders must then submit a detailed written report of the non-permitted take. Pending review of these circumstances, NMFS may suspend enhancement/research activities.

11.1.2 Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.

Staffing, and other support logistics for the upper Columbia River summer chinook production programs are provided by WDFW. Funding for the programs is provided by PUD No. 1 of Chelan County and PUD No.1 of Douglas County for the purpose of mitigation for lost fish production associated with hydroelectric power system development in the region. Staffing and funding are available and committed to allow at least partial implementation of data collection, and monitoring and evaluation, described in this section. Presently there is no formally funded monitoring and evaluation program for the Rocky Reach/Turtle Rock program (Chelan PUD), and only recent agreement with Douglas PUD to begin monitoring and evaluation of the Wells summer chinook program. Plan, tasks, and methods monitoring and evaluating objectives relative to summer chinook program performances.

11.2 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.

WDFW submits annual reports as conditioned by Section 10 Permit # - 1347 covering the period from January 1- December 31 and due to NOAA Fisheries by January 31st of the year following release per permit Reporting and Annual Authorization Requirements; Section C.1-C.9. Specifically, the annual reports include detailed activities as per requirements including monitoring of performance indicators identified for the program. Monitoring activities have already been approved by the permit. Any additional harm to listed fish beyond the permit allowances would be communicated immediately to NOAA Fisheries by the WDFW ESA response lead in the area for review or needed changes.

Section 12. Research

12.1 Objective or purpose.

Research is directed at determination of supplementation program contribution rates, the ecological and genetic effects of the program on the natural population.

12.2 Cooperating and funding agencies.

Chelan PUD (Funding)

WDFW
Yakama Tribe
Colville Tribe
NFMS

12.3 Principle investigator or project supervisor and staff.

See also permit 1347 or 1482 (pending) annual reports.

12.4 Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.

Upper Columbia River ESU spring chinook salmon (Oncorhynchus tshawytscha.
Upper Columbia River ESU summer steelhead trout (Oncorhynchus mykiss).
Upper Columbia River ESU Sockeye Salmon
Bull Trout populations (Columbia River Distinct Population Segment)

12.5 Techniques: include capture methods, drugs, samples collected, tags applied.

See also permit 1347 or 1482 (pending) annual reports.

12.6 Dates or time periods in which research activity occurs.

See also permit 1347 or 1482 (pending) annual reports.

12.7 Care and maintenance of live fish or eggs, holding duration, transport methods.

12.8 Expected type and effects of take and potential for injury or mortality.

See also permit 1347 or 1482 (pending) annual reports.

12.9 Level of take of listed fish: number of range or fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached "take table" (Table 1).

See also permit 1347 or 1482 (pending) annual reports.

12.10 Alternative methods to achieve project objects.

See also permit 1347 or 1482 (pending) annual reports.

12.11 List species similar or related to the threatened species; provide number and causes of mortality related to this research project.

See also permit 1347 or 1482 (pending) annual reports.

12.12 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury or mortality to listed fish as a result of the proposed research activities.

See also permit 1347 or 1482 (pending) annual reports.

Section 13. Attachments and Citations

13.1 Attachments and Citations

Biological Assessment and Management Plan (BAMP). 1998. Mid-Columbia River hatchery program. National Marine Fisheries Service, U. S. Fish and Wildlife Service, Washington Department of Fish and Wildlife, Confederated Tribes of the Yakama Indian Nation,

Confederated Tribes of the Colville Indian Reservation, and the Confederated Tribes of the Umatilla Indian Reservation. Mid-Columbia Mainstem Conservation Plan. 135 pp.

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Petersen, K., A. Murdoch, M. Tonseth, T. Miller, and C. Snow. 1999a. 1994 brood sockeye and chinook salmon reared and released at Rock Island fish hatchery complex facilities. Report # SS99-02. Fish Program, Salmon and Steelhead Division. Wash. Dept. Fish and Wildlife, Olympia. 91 pp.

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SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

14.1 Certification Language and Signature of Responsible Party

"I hereby certify that the information provided is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973."

Name, Title, and Signature of Applicant:

Certified by_____________________________ Date:_____________

Take Table 1. Estimated listed salmonid take levels by hatchery activity.

Steelhead

ESU/Population	Upper Columbia Steelhead
Activity	Wells Hatchery Summer Chinook Program (Methow and Okanogan River Broodstock)
Location of hatchery activity	Wells dam left and right bank ladder traps.
Dates of activity	Early May – mid-November
Hatchery Program Operator	WDFW

Type of Take	Annual Take of Listed Fish by life Stage (number of fish)			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass (a)				
Collect for transport (b)				
Capture, handle, and release (c)			30 – 40 [1]	
Capture, handle, tag/mark/tissue sample, and release (d)				
Removal (e.g., broodstock (e)				
Intentional lethal take (f)				
Unintentional lethal take (g)				
Other take (specify) (h)				

[1] Yearly estimation of steelhead encountered during salmon broodstock collection (K. Peterson, WDFW, pers. comm. June 1997).

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

Take Table 2. Estimated listed salmonid take levels by hatchery activity. See also Permit #1196 Annual Reports. Numbers submitted here are those allowed in the permit.

Steelhead

ESU/Population	Upper Columbia Spring Chinook
Activity	Wells Hatchery Summer Chinook Program (Methow and Okanogan River Broodstock)
Location of hatchery activity	Wells dam left and right bank ladder traps.
Dates of activity	Early May – mid-November
Hatchery Program Operator	WDFW

Type of Take	Annual Take of Listed Fish by life Stage (number of fish)			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass (a)				
Collect for transport (b)				
Capture, handle, and release (c)			0[1]	
Capture, handle, tag/mark/tissue sample, and release (d)				
Removal (e.g., broodstock (e)				
Intentional lethal take (f)				
Unintentional lethal take (g)				
Other take (specify) (h)				

[1] Run timing separates the migration of listed upper Columbia spring chinook from summer chinook trapping time from June 28 – August 28. .

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.

g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

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